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Going Forward

THE annual Return of Engineering and Financial Statistics issued by the Electricity Commissioners is a veritable mine of information, not available from any other source, regarding the supply section of our industry. It is not only the official record of things as they are, but is also an indispensable guide for those who wish to forecast the future of the industry as a whole, since this depends very largely upon supply progress. From the details given in this series of Returns we can trace the growth of certain tendencies—a growth that will in the most important aspects almost certainly be accelerated as time goes on.

Thus an increase of 169 in the number of authorised undertakings, apart from extensions to existing areas, in less than ten years, reflects the latent demand for electricity in areas formerly regarded as presenting few opportunities for successful ventures. Perhaps of even greater significance is the increase of 253, during the same period, in the number of undertakings relying wholly or partly on bulk supplies.

Turning to the engineering side we see signs of the impending doom of the reciprocating steam engine for generating electricity in a reduction of some 10,000 kW in one year while the steam turbine extensions in large sizes totalled 322,000 kW, although some of what was lost to the steam engine was picked up by the oil engine.

The advance in steam generator design recently is symbolised by the boilers at Ironbridge each with a maximum continuous rating of 270,000 lb. per hour. Ten years ago only 30 per cent. of the aggregate evaporative capacity had an output of 30,000 lb. or more (and not much more), and more than half of the total worked at less than 200 lb. per sq. in. compared with one-sixth now. Signs of the too-gradual trend towards standardisation of distribution voltages and frequencies may be found in these returns, but they are not so obvious as we could desire.

The number of electricity consumers in 1930-31 increased by 15 per cent. to just over four million. A recent Board of Trade Report gave the increase in the number of gas consumers in 1931 as 214,395, bringing the total to 9,558,229. Leaving our readers to work out the date when the consumers of electricity will outnumber those of gas (taking into account an increase of 7.4 per cent. in the total kWh generated last month, making the advance for the year so far 7.3 per cent.), we would ask why gas statistics should be available for nearly a year ahead of these electrical returns. We believe the answer to be that publication of our own Return is held up by delays on the part of a small minority of undertakings in sending in the requisite information to the Commissioners. This delay seriously invalidates the usefulness of the figures, and we appeal to the defaulters to provide the data promptly, as they surely must be available if their undertakings are run on business lines.

On Applying for a Job

OF course there are two sides to every question—sometimes there are twenty-two! A fortnight ago (ELECTRICAL REVIEW, September 2nd, p. 328) "An Employer" analysed and criticised the applications that had been received for an advertised vacancy. To-day "An Applicant" turns the tables upon him and states some of the reasons why replies are incomplete. Caution makes him reluctant to put all his goods in the shop window, or, in other words, he avoids committing himself regarding certain details until he possesses fuller information. He is influenced by his circumstances at the time of writing—whether he is in employment or out of it, or in fear of being out; he may be in pressing need or merely anxious to make a change for the better, a difficult, but not impossible, thing electrically even in these days. In the main, he wants to get into touch with the advertiser so that he can make his merits known. On the other hand, the employer requires, in his preliminary examination of replies, to sort out the wheat from the chaff. How can he do it quickly unless the essential qualifications are stated, and stated clearly? There is much to be said in favour of the typed, well-arranged schedule. But the applicant feels that he ought to know the place of employment before he applies. This is not unreason-

able. He wants to be sure that he is not applying to his present employer; this he can be satisfied about by asking the publisher not to forward his letter if a stated firm is the advertiser. Thousands of our readers know from personal experience how controversial the whole question is. Many points have not been touched upon by either "Employer" or "Applicant" which we feel correspondents would like to discuss.

An Electrical Show

MR. LL. B. ATKINSON'S letter in our "Correspondence" pages refers to the fact that while many exhibitors at the British Industries Fair would prefer the date to be altered because a change would improve its overseas trade value, they do not withdraw because it unquestionably helps the Home trade. This proves the need, so frequently stressed here, for a short, sharp electrical trade market at one or more places in this country. But could the electrical industry alone run a truly representative ten days' show which would bring buyers in great numbers? We mean a trade event possessing a drawing power equal to that of the whole Birmingham or London part of the Fair? Sooner or later the industry may find it good business to run a month's exhibition, but what might more profitably exercise our thought is the holding of a big electrical show in London to draw half a million or a million visitors to see a complete and magnificent display of electrical apparatus of all kinds and a popular demonstration of innumerable electrical effects. We believe that the time for this is nearly ripe. It would bring grist to the electrical mill, and could most appropriately be made to mark the completion of the grid.

A Big Convention Too?

WHY not also mark the great grid event of next year by holding a big National Electrical Convention? Not a dry technical function, but a week's assembly of all the bright and progressive spirits in the Municipal Electrical Association, the Electric Power Companies' Association, the other electricity concerns, and the Electrical Contractors' Association. Let us invite everybody who can help to shout aloud the praises and merits of electricity, impressing the Press and the People, and boosting the sales of electricity and electrical appliances!

Farnworth Shows the Way

MR. A. J. HUTCHINSON, the chief electrical engineer to the Farnworth U.D.C., has shown how concentrated effort has been rewarded in a medium-sized undertaking. As the note on his wash-boiler campaign in our Business Notes section records, by enlisting the aid of the local Press, the members of his staff, and the insatiable desire of the public for "something for nothing," he managed to hire out as many wash-boilers in three weeks as he expected to dispose of in twice that number of months. Emboldened by his success, he is next taking up particular appliances one by one, and we see no reason why the results should not be equally satisfactory. Also, we commend his example to those engineers who erroneously believe that everything comes to him who waits. Wonderful as progress has been, only the first-fruits of the domestic business have so far been gathered in.

Consumers and Change-overs

WE are often asked by consumers whether a supply undertaking is bound to replace consumers' apparatus made unusable by a change of system from d.c. to a.c. or from one frequency to another. These change-overs can be undertaken only with the consent of the Electricity Commissioners, and one month's public notice must be given before the start of the work. Apparatus installed prior to the notice must be replaced or paid for by the supply authorities, but if the consumer purchases appliances after that date also he may be able to claim compensation, unless the undertaking has given individual notice to its consumers within a reasonable period before the date fixed for the beginning of the change-over. A reasonable period is regarded as not less than one month or more than six. Those who install appliances likely to be affected by a change-over should protect themselves by ascertaining what notices (if any) have already been served.

The New Australian Duties

IN this issue we give details of the Australian Customs tariff revisions in so far as they affect electrical machinery. The relevant sections have been reclassified, and the duty upon the principal items has been altered from a specific to an *ad valorem* basis. Consequently, it is not easy to calculate the effects, but as the underlying intention of the revisions generally is the reduction of the duties it may be stated quite safely that the revision is in the right direction. This will give satisfaction to British exporters, who have suffered severely from the high Australian Customs dues in the past few years, but as the "general" tariff has been lowered at the same time there cannot be much improvement in the competitive position. Indeed, it has been stated that in some directions the simultaneous reduction of the British preferential and general tariffs will operate in favour of the foreigner.

The Middleman

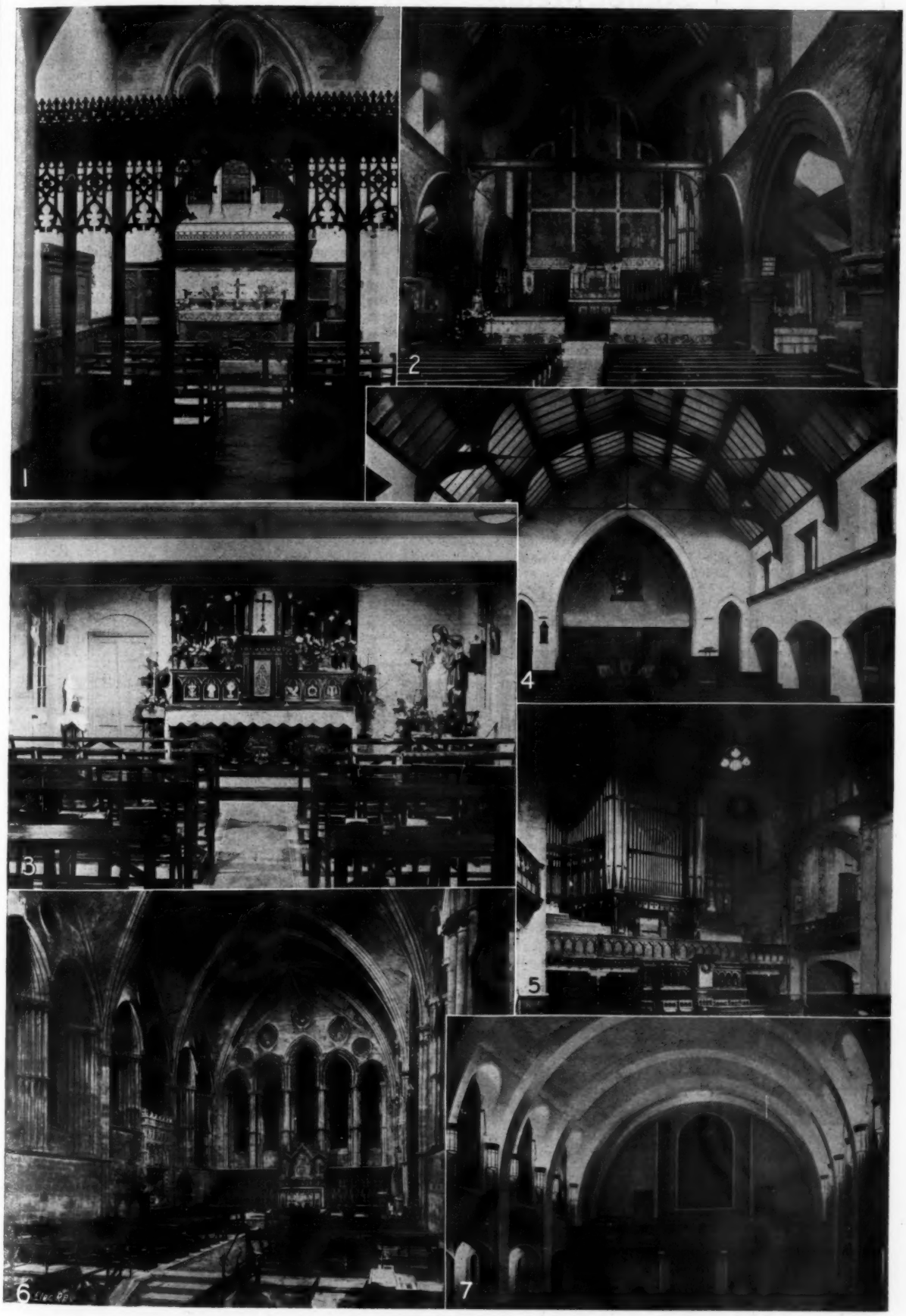
IN his presidential address to the Engineering Section of the British Association at York, Profesor Miles Walker implied that the "middleman" often sold electricity to the consumer unjustifiably at ten times the price of its cost. As the meetings of the B.A. are open to the general public we wish that it had been made clear that a large proportion of the difference between the two prices is due to costs of local distribution, which would have to be accounted for in the retail price, however enlightened the policy of the intermediate supply authority. The man in the street does not realise this, and might excusably infer that any charge above, say, ½d. per kWh was due to what he would call profiteering, and thus confuse the sheep with the goats. We believe that "profiteering" is the wrong word, because the profits to be made by excessive charges to the consumer are less than those produced by a system in which service is the aim.

For Those Who Doubt

WE heard recently from a representative of one electric-cooker manufacturing company that his company has so far this year sold 12,000 cookers, and we read in a publication of another similar company that "nearly 50,000 electric cookers are installed per annum in the United Kingdom." These figures deserve the greatest prominence, for the benefit of those, both in and out of the electrical industry, who still insist that the complete electric cooking equipment is unpractical and inefficient, and that "all-electric" cooking cannot possibly be developed on a large scale. Hull last year installed 2,764 cookers, Manchester let out its ten-thousandth cooker some time ago, and Croydon has an output of twenty cookers per week. Of the thirty million kWh sold by the Wimbledon undertaking during its financial year prior to January about half was used for heating and cooking. These instances are sufficient proof that reasonable tariffs and suitable hire-purchase schemes will bring along the cooking business.

A Little Brighter

ALTHOUGH there is still a tendency for imports to increase and exports to decrease, the Board of Trade statistics for August are a trifle more cheering than those of the previous month. It will be seen from our usual monthly table on a later page that exports show a decline of 4 per cent. in value as compared with the July figures, imports rising by 5 per cent.; in the previous month exports fell 9 per cent. and imports rose 11 per cent. Even if this state of affairs is not quite what we should wish for, it is reassuring to discover that, while exports are only 9 per cent. lower than in August, 1931, imports have fallen by no less than 40 per cent.



A Few Examples of Recent Church-lighting Installations (*see page* 398).

1. The Lady Chapel, St. Peter's, Arkley, Barnet, Herts. 2. St. Anne's, Derby. 3. St. Raphael's Chapel, Barvin Park, Potters Bar, Middlesex. 4. The Lea Road Congregational Church, Wolverhampton. 5. Highbury Quadrant Church. 6. The Lady Chapel, Hereford Cathedral. 7. The new Wesleyan Church, Stechford, Birmingham

Some Metallurgical Problems

Joint meeting of the Institute of Metals and the Iron and Steel Institute

THE twenty-fourth annual autumn meeting of the Institute of Metals was held this week at the Institutions of Civil and Mechanical Engineers jointly with the meeting of the Iron and Steel Institute. It was attended by upwards of 300 members of both Institutes from many parts of the world. The opening session last Monday evening was occupied by the Autumn Lecture, delivered by Dr. H. S. Gough (N.P.L.), on "Corrosion-Fatigue of Metals."

Corrosion-fatigue was defined as the behaviour of metals subjected to cyclical stresses while exposed to an oxidising environment. The recognition of oxygen as a factor in fatigue reconciled many unrelated observations made in independent researches and some fundamental facts regarding the nature of corrosion fatigue could be deduced from changes in microstructure. It was concluded that the mechanism of corrosion-fatigue could be reduced to an ordered sequence of physical and chemical events explicable in the light of existing knowledge and that the atmosphere played a part in the fatigue resistance of metals tested under laboratory conditions.

Messrs. W. R. Barclay, G. A. V. Russell, and H. Williamson described a modern plant erected in this country for the hot-working of nickel and nickel alloys. The main plant consists of a 750-ton hydraulic forging press and of a hot-rolling mill comprising (*a*) an 18-in. three-high universal type mill with horizontal and vertical rolls for the production of sheet, bar and strip, and (*b*) a 52-in. three-high Lauth type mill for the rolling of sheet-bar and small rectangular ingots into sheets.

An Electric Furnace

Electricity is obtained from Birmingham Corporation at 11 kV and transformed to 400 V. The two hot-rolling mills are arranged on either side of a common gear double-reduction unit driven by a 750-h.p. 585-r.p.m. induction motor; a duplicate motor will be installed when the production requires the simultaneous running of both mills.

The heating of the sheet bar is carried out in a specially designed semi-continuous double-ended electric furnace, through which the metal is carried by a walking beam conveyor actuated by push-button control. To prevent grit sticking to the material, metal rods and not refractory materials support the charge. The elements are of silicon-carbide ("Globar"), arranged vertically in each side of the chamber. Electrical contact with the elements is obtained by spring-loaded water-cooled terminals. The furnace has an output of ½-ton per hour at temperatures up to 1,300 deg. C.

The electrical rating is 300 kW, divided into two separately controlled zones. The 400-V supply is stepped down at the furnace by a transformer provided with tappings which allow the voltage to be increased as the resistance of the elements increases. Regulation of temperature is automatic, by a potentiometer controller in each zone. The furnace chamber measures 12 ft. by 4ft. 6 in., and is heat-insulated with Kieselguhr brick and powder.

Merits of Electric Heating

As most of the high-nickel content alloys (*e.g.* nickel-chromium) pass through a brittle range between 700 and 800 deg. C., it is essential that metal to be forged or rolled shall be uniformly heated at a temperature well above this range. Coal-fired furnaces are cheaper with regard to fuel but are not generally satisfactory, and in the best oil or gas-fired furnaces it is difficult to get an atmosphere sufficiently non-oxidising.

More important still is freedom from sulphur which forms nickel sulphide at high temperatures and causes local surface cracking, especially if the metal is covered by a layer of oxide. The authors find that electric heating is unquestionably the most satisfactory. The furnace described and illustrated by permission of the Institute of Metals was made by Birmingham Electric Furnaces, Ltd., and an illustration of the plant is reproduced on page 393. The general illumination of the mills has an intensity at floor level of six foot-candles without local lighting units.

Artificial Patina

The natural green patina (basic copper sulphate) that appears on copper is highly protective and Mr. W. H. J. Vernon described methods for producing it artificially. Treatment with ammonium sulphate solution in which basic copper sulphate was suspended gave the required effect but the patina broke down in severe weather. A stable patina was produced by anodic treatment for 15 minutes. A carbon cathode was used and the electrolyte (95 deg. C.) contained 10 per cent. magnesium sulphate, 2 per cent. magnesium hydroxide, and 2 per cent. potassium bromate. The current density was 4 A per dm^2 with the electrodes 1.5 in. apart, corresponding to a p.d. of 5 V.

The properties of commercial copper at high temperatures have been studied by Mr. G. S. Bamford, who found that although there was a decline in resistance to alternating stresses at from 200 to 300 deg. C. there was no brittle range of temperature below 600 deg. Impact strength (Charpy test) was at a maximum between 200 and 340 deg. C., after which it declined sharply, but, except for "tough-pitch" arsenical copper, it was high at all temperatures up to 600 deg. Nickel-copper had the greatest endurance to alternating stresses exceeding the endurance limit.

A Special Cast-iron

The development of a grey cast-iron (Nicrosital) resistant to growth and scaling and possessing great ductility was described by Dr. A. L. Norbury and E. Morgan. The iron contained the following percentage proportions of alloys: nickel, 18; silicon, 6; chromium, 2; total carbon, 1.8; and manganese, 1.

It was non-magnetic, had an electrical resistivity of about 160 microhms per cm. cube, and had good corrosion-resisting properties, which were improved by the addition of copper. The liability of cast-iron to growth depended largely on the size and number of graphite flakes in the structure, and the iron described owed much of its growth resistance to its low total carbon content.

Steam from Blast-furnace Gas

Among the papers from members of the Iron and Steel Institute was one by Mr. A. F. Webber on the generation of steam from blast-furnace gas. The author expressed the view that improvements in the steam turbine had strengthened its position relatively to the gas engine, but that the progress might be offset by boiler-house losses. In iron and steel works the boiler-house efficiencies were often from 50 to 55 per cent. only, as against upwards of 80 per cent. in many supply undertakings. This difference was not to be accounted for by fluctuating loads, as high efficiency obtained under these conditions showed.

Some disadvantages of blast-furnace gas were: (1) low calorific value and flame temperature, due to the large proportion of inert gases; (2) high moisture content; (3) high dust content; and (4) irregularity in volume and pressure. The flame temperature of the gas was 2,000 deg. F., which reduced the radiating power of the flame by 50 per cent. compared with the 2,500 deg. obtained with pulverised fuel, since radiating power is proportional to the fourth power of its absolute temperature. Heat loss due to inert gas could be minimised by economisers or air preheaters, giving chimney temperatures of 350 deg. F. or less.

The Effect of Moisture in Gas

The moisture content of blast furnace gas at from 350 to 500 deg. was from 30 to 35 gr. per cu. ft. Its deleterious effect on thermal efficiency was often over-estimated, due to an incorrect analogy with moisture in solid fuel, which was in liquid form and had to be heated to 212 deg. F., evaporated, and then superheated to the flame temperature, whereas water introduced as vapour by the blast-furnace gas was at 300 to 400 deg. F., and absorbed little if any heat. The real disadvantage was that the high specific heat of water lowered the flame temperature. Condensation in the gas mains, which formed a sludge with the dust, could be reduced by the incorporation of traps.

A blast-furnace gas carrying two gr. of dust per cu. ft. would carry 0.025 lb. of dust into the furnace per therm liberated; pulverised coal with a calorific value of 11,000 B.th.u. per lb., and an ash content of 5 per cent., would carry 0.45 lb. of dust of a more troublesome nature. Dirty gas precluded the use of the most efficient burners. Three or four per cent. might be lost thus, but the cost of cleaning increased the cost of gas (taken at 0.56d. per 1,000 cu. ft.) by 25 per cent.

Where the gas had been cooled by cleaning, both air and gas should be preheated and the feed water brought to the highest practicable temperature by exhaust steam. The greatest loss due to irregularity of gas supply was in the coal burned to maintain steam output. Blast-furnace gas possessed three important advantages compared with coal: (1) more accurate fuel-air proportioning, which reduced excess air and leaving losses; (2) the elimination of losses due to sensible heat and unburned carbon in hot ash; and (3) reduced loss due to previous vaporisation of moisture. These losses might amount to 2 per cent. of the heat input to coal-fired boilers. The paper contained considerable data in support of the main contention that high thermal efficiency from blast-furnace plant was quite practicable.

Electricity in Coke-oven Plant. By C. H. S. Tupholme

A variety of applications

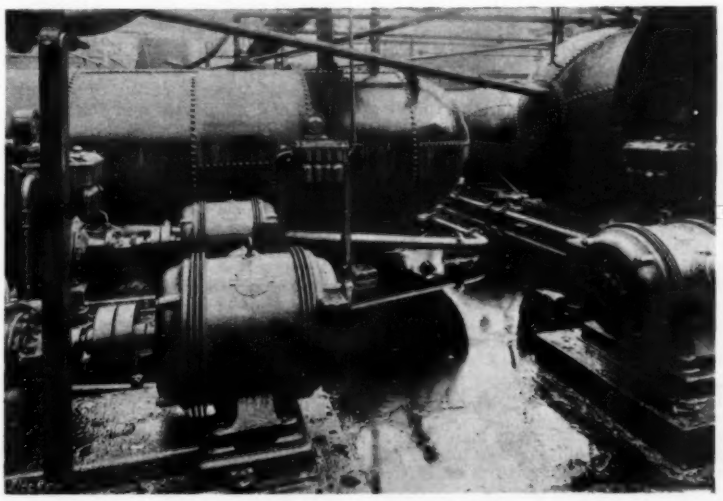
COKE-OVEN plant throughout the country is gradually being modernised as economic conditions permit, and a prominent feature of the process is the electrical driving of all moving plant in place of manual operation. The principal operations are the handling and cleaning of coal, charging the coal into the ovens, pushing out the red-hot coke, quenching the coke, and screening and grading it for the various purposes for which it is intended. In addition to these major operations, there is a large number of other applications of electrical power to the actual control of the ovens, as well as for pumping and other services in the by-product plant.

The change-over to a.c. is fairly general. The types of motor and switchgear vary according to the service, though obvious essentials are robustness, simplicity, and either flameproof or dustproof enclosures. For the generation of power surplus coke-oven gas can be used in some cases, in others pulverised coal is burnt, while in some modern plants steam raised by the sensible heat recovered from the red-hot coke in the dry coke-cooling process, is used for generating electricity.

A typical modern coke-oven plant showing the discharging ram

Some Actual Examples

The latter class of installations is found in America or on the Continent. Among examples in this country is the Brookhouse Colliery, where steam is provided for the coke ovens and turbines by two Simon - Carves multiple drum boilers of a capacity of 30/40,000 lb. of steam per hour, which can be fired with pulverised fuel, surplus gas, or both, by Eickworth burners. The power plant and switchgear is entirely of G.E.C. manufacture and consists of a 1,875-kW, 3,300-V, 50-cycle alternator, driven by a Fraser and Chalmers turbine, with Mirrlees Watson condensers, a Visco cooling tower, and a Neckar water softener.



"Lancashire" motors and "Ellison" control gear in an exposed situation in a by-product works

At the Derwenthaugh coke-oven plant of the Consett Iron Co. two turbo-generator sets are installed, each of 1,250-kVA capacity m.c.r., comprising a Rateau impulse turbine running at 5,000 r.p.m., geared to 1,000-r.p.m., 3-phase, 50-cycle, 550-V alternators. The main switchgear is "Metrovick," and comprises a ten-panel cubicle board of the remote-controlled type, divided into two sections, arranged so that the complete plant can, if necessary, be run off either section alone, with the necessary feeders to the step-up transformers and outgoing connecting line to the company's other stations.

Particular care has been exercised to maintain an uninterrupted supply to all portions of the plant which must be kept in continuous operation, while also providing for safe access to all parts for routine maintenance, testing, and repairs. Mounted behind the main switchboard, in an annexe to the power house, is a sixteen-panel switchboard of the oil-immersed ironclad circuit breaker type for distribution to the by-product recovery plant, together with two 60-kVA oil-immersed self-cooled transformers for lighting.

In some cases power is generated at the colliery and then fed to the coke-oven plant, where it is stepped down for local use. An example of this practice is to be found at Castleford, electricity being obtained from the Glasshoughton Collieries at 3 phase, 50 cycles; it is transmitted at 3,000 V to the transformer house at the ovens where it is stepped down to 240 and 440 V. The feeders to the various sections of the plant consist of three-core, paper-insulated, double-wire armoured cable, controlled by Ellison unit-type switchgear. These feeder control units consist of oil-break circuit breakers of heavy rupturing capacity, mounted in conjunction with busbar chambers having isolating switches, and fitted with overload and no-voltage trips, together with ammeters and watthour meters.

Interdependent Operations

Control gear for coke-oven works is being designed to eliminate so far as possible dependence upon human effort. By the use throughout of a complete system of sequence starting any operation depending upon another can be so electrically interlocked that in the event of a failure of a key operation all others dependent upon it will automatically close down in their correct sequence.

The squirrel-cage motor is commonly employed for coke-oven plant, the two former difficulties of starting torque and speed control being overcome by special "Metrovick" design.

The stator follows standard practice. The rotor, however, is of the double-wound solid bar type, in the core of which is embedded two windings in special relation to the core teeth and of varied resistance and reactance, so that at the moment of starting one winding predominates and provides a starting torque nearly equivalent to a slip-ring rotor with resistance in circuit. When full speed is reached the second winding predominates, giving a characteristic similar to a slip-ring machine with short-circuited slip-rings. There is no switching from one winding to the other, and the change takes place gradually as the motor speeds up, with no variation in acceleration against a constant load.

There is a wide field for motors driving the coal-handling plant, which includes conveyors, elevators, and coal-cleaning, with, in some cases, coal-breaking. At Derwenthaugh, for example, two 100-ton per hour belt conveyors are driven by a direct-started squirrel-cage motor. A 200-ton per hour inclined belt conveyor, which feeds the main coal bunker, is driven by a 60-h.p. squirrel-cage motor, which is star-delta started.

Clock-controlled gear for automatically operating air-inlet and waste-gas outlet valves

The coal-cleaning plant at these coke ovens is most elaborate, and is driven by thirteen motors, varying from 5 to 80 h.p. All of them are of the squirrel-cage type, controlled by a main contactor board and operated by central push-buttons on the cleaning table floor. These are so arranged that on the operation of a single push-button the whole of the motors successively come into operation automatically.

A similar example of electrical interconnection is installed at Castleford in connection with the coke-handling and screening plant. There the coke is screened into various sizes, and the various motors driving the conveying and screening plant are started automatically by Igranic contactor gear. The screning plant is push-button controlled, and the self-acting panels provide an automatic sequence, maintaining the proper flow of material on to the conveyors and elevators.

Electrical Gas Burner Control

In the actual coking operation there is one electrical function of unusual interest. The combustion of the gas for heating the coke ovens is changed from one side of the oven to the other by reversing the gas valves, main dampers, and the air ports. Gas burns on each side of the oven for about thirty minutes, but conditions sometimes arise which make it advisable to prolong combustion on one side, and means are provided by which the timing may be varied by two and a half minutes, or fractions of this time.

Such an installation is to be found at Castleford, among others, where the time control and reversal of each set of valves and dampers is entirely automatic, being accomplished by Igranic self-acting reversing panels, carrying master time switches. There are mechanically operated limit switches on the Koppers winch gear which are inter-connected with the automatic controlling panels.

At the Smithywood coke-oven plant of Thorncliffe Coal Distillation, Ltd., the air inlet and waste gas outlet valves are opened and closed in the same way, reversing at thirty-minute intervals through Igranic control gear. In this case a steam-operated standby is provided in case of power failure. Should for any reason the clock fail to operate the mechanism at the pre-determined time, within one minute a water safety device will cause a steam siren to sound. This phase of coke-oven operation is necessarily vital, and only very reliable apparatus can be tolerated.

Other Applications

The coke ram or pusher is invariably operated by electric motors. At the Derwenthaugh works the coke ram, which is in duplicate, is fed by 500-V 3-phase trolley wires. The five motors are protected by a five-way panel with contactor-type circuit breaker and push-button reset, so arranged that in order to reset all controller handles must be brought to their off positions. The travel motion, by which the entire ram and its carriage is traversed along rails in front of the oven battery, is operated by a 60-h.p. slip-ring motor with a cubicle-type contactor starter, operated by a drum-type master controller in the driver's cabin. The pusher motion, for driving the ram through one end of the oven, pushing the coke out at the other, is operated by an 80-h.p. slip-ring motor.

The machine also carries a leveller bar for spreading the coal as it is charged into the oven, and this is driven by a 30-h.p. induction motor. The oven doors are opened and lifted by gear driven by a 5-h.p. motor, and the doors are moved to and from the oven front by another 5-h.p. motor. The travel, pusher, and levelling motions are protected by time and interlocking switches to prevent their being operated while the ram is travelling across the ovens; alternatively, the ram cannot be operated up and down the rails while any of the other functions of the machine are being carried out. This ram is equipped with " Metrovick " gear.

Electrical plant is also required for a number of auxiliary services, including pumping water and tar, wash oil for the benzol recovery plant, and similar services. Much of this equipment works in the open with the minimum of protection, and robustness and simplicity are essential.

The Expansion Circuit Breaker

THE principles and applications of the expansion circuit breaker were fully described in the ELECTRICAL REVIEW of May 22nd, 1931, and February 5th, 1932. Some notes on operating experience with this type of switch were given in a recent issue of *Siemens Zeitschrift* by Dr. Fritz Kesselring.

About 600 expansion breakers rated at from 2 to 30 kV and from 350 to 3,000 A are reported to have cleared satisfactorily some 90 short-circuits in various networks during the past two years. The higher breaking speed has caused failure, due to vibration, of the die-casting forming the tripping ring; this ring is now being constructed of piano wire. All joints are webbed or riveted where possible.

Newly developed spring drives have ensured a high closing speed. " Expansive," the operating liquid, consists mainly of chemically pure water, and has caused heavy corrosion in the first breaker supplied, while the contact springs and other metals formed an electrical couple. This trouble has been cured by the use of metals differing by less than 0.05 V in the scale of potential and which also become polarised after a short passage of current.

Evaporation of liquid has been prevented by covering the surface with a thin film of oil. The loss of liquid due to breaking the circuit without arc formation amounts to a maximum of 14 mm. per 1,000 operations, and the switch can be opened under load 2,000 times before renewal of the " Expansive " becomes necessary.

Steam formed in breaking short circuits has not been found to cause flash-overs, which tests have shown to take place along the surface of the steam and not through the jet. At a distance of 4¾ in. in still air at 77 deg. F., the mean flash-over voltage in eleven tests was 51 kV; under steam at 176 deg. F. the corresponding value was 55 kV.

It is claimed that, except in the corrosive atmosphere of chemical works, tests show the expansion breaker to be no more sensitive to dirt than the oil breaker. For dealing with heavy currents silver-plated contacts are provided.

For high-current ratings, a second and independently operated breaker is connected in parallel with the load breaker; the result is that the heating of the expansion chamber and evaporation of liquid remains unchanged. When interrupting the circuit the " current breaker " opens first.

Although the price of the expansion breaker is more than that of an oil breaker, economies in building structure, it is claimed, enable the overall cost to compare favourably. When fitted into existing cubicles designed for oil breakers, the expansion breaker is generally more costly. For outdoor work the prices of the two types of switch are about equal at 100 kV; for higher voltages the oil breaker is said to be more costly.

Some Driving Forces in the Industry

The personnel of J. H. Tucker & Co., Ltd.

1, Mr. E. K. Muir (*Elliott & Fry, Ltd.*), general sales manager. 2, Mr. C. F. J. Tranter, financial director. 3, Mr. J. B. Tucker (*Whitlock*), managing director. 4, Mr. S. G. Smith (*W. Nicol Smith*), Scottish manager. 5, Mr. R. Whitley (*Mindel-Faraday*), London manager. 6, Mr. J. Evans (*Lacey's Studios*), accounts department. 7, Mr. J. N. R. Hannam (*Harold Baker*), works manager. 8, Mr. J. E. Gaffney, technical department. 9, Mr. S. A. Millington (*Harold Baker*), assistant sales manager.

Platinum Plating. By G. W. Lamotte, M.A., Assoc.I.E.E.

THE electro-deposition of platinum directly on base metals, such as brass, copper, nickel silver, &c., has recently been perfected in this country, and under the new process this form of plating has been rendered commercially possible for articles of general use. Metal articles generally are plated both for protection and ornament; for both purposes a deposit of pure platinum gives results that are unobtainable by other methods.

Platinum plate is stainless and untarnishable. It is unaffected by acids and most chemicals and successfully resists the action of fog, sea air, and the smoky atmosphere of large cities. The appearance of polished platinum is very nearly indistinguishable from that of the highest grade polished silver. The brilliant lustre is permanent; the only cleaning needed is ordinary dusting, or rubbing over with a damp cloth; polishing powders, pastes, or liquids are unnecessary.

Platinum being hard and durable, the resistance to wear of plated articles is remarkable, and the plating is unaffected by high temperatures. No previous plating is required, as with chromium. Platinum can be deposited directly on the base metal.

Methods of Procedure

The plating process follows well-known lines. After degreasing and washing, the article is suspended in the plating bath. The electrolyte contains approximately three ounces troy of plating salt to each gallon of solution, though in special cases good results can be obtained with a smaller quantity. The cost of the plating salt is £7 per ounce troy (with the basic price of platinum at £10 per ounce troy). The thickness of the deposit varies from 0.00002 in. for articles not subjected to appreciable wear (*i.e.*, photograph frames, sports trophies, &c.) up to 0.00004 in. for articles required to endure rough usage and constant friction (spoons, forks, cigarette cases, &c.). In the case of electrical fittings a deposit of 0.00002 or 0.00003 in. is sufficient.

A current density of 7.5 A per sq. ft. is recommended, and under these conditions 0.00003 in. of plate is deposited in six minutes. An approximation to the actual cost of the platinum deposited is a figure of ¼d. per sq. in. for the lighter deposit and about 1¼d. per sq. in. for the heavier (0.00004 in.).

The initial uses of platinum plate in the electrical industry will doubtless be confined to lighting fittings and standards, and to products that have hitherto been silver plated or chromium plated, such as switch covers and plates, bell pushes, and the like. Platinum plating would be particularly suitable for articles required to withstand heat, such as irons, warming plates, and water heaters in period design.

Considerable use has been made of chromium plate for articles used aboard ship, and, provided that they are occasionally wiped down, the chrome has proved satisfactory. This wiping would appear essential, since when it has been omitted trouble has occurred, a case in point being that of fan blades. The superior resistance offered by platinum would seem to afford a solution.

It will be appreciated from the foregoing that platinum plating, while moderate in cost when compared with the market price of the pure metal, has qualities of appearance and resistance to wear and corrosion that establish it as the most perfect form of plating yet discovered; being indeed the covering of the article with a thin layer of the most permanent of metals.

Small All-electric Houses

An announcement which appeared recently in a Lancashire newspaper will go some way towards dispelling the impression remaining in some quarters that the provision for adequate electrical service in a house adds materially to the cost. Mr. M. F. Dalton, a Whitefield builder, is advertising substantially built brick houses, with a 20-ft. frontage, comprising a square hall, a large living room (17 ft. 8 in. by 11 ft.) with double bay window, scullery, larder and store and coal bunker, three bedrooms, bathroom and W.C., at a cost of £383 free from all road-paving and legal charges on a 999 years' lease. These houses are fully equipped for electric light and in addition have three power plugs. An electric wash-boiler, ironer and kettle are also provided.

Dnieprostroi. By G. Shapiro, A.M.I.E.E.

A colossal combination of hydro-electric and industrial works

"DNIEPROSTROI" hydro-electric power station on the River Dniepr forms only a link in the huge industrial undertaking which is being built around the station. This combine, known as "Dnieprokombinat," will embrace the following works:—

(1) A hydro-electric power station with plant of 558,000-kW capacity, step-down sub-stations with 1,230,000 kVA of transformers, and more than 620 miles of 154-kV transmission lines; (2) a three-chamber lock for making the river navigable over the rapids; (3) coke works comprising 276 metallurgical-coke ovens, with an annual production of 80,000 tons, and chemical works for the extraction of the bye-products from the gas; (4) metallurgical works comprising four blast furnaces, ten 150-ton stationary and seven 100-ton tilting Martin furnaces, three electric furnaces, rolling mill plant, &c., designed for a yearly output of 1,250,000 tons of cast iron and 1,000,000 tons of steel; (5) ferro-alloy works with an annual production of 80,000 tons of ferro-manganese, 20,000 tons of ferro-silicon, 4,000 tons of ferro-chromium, and 1,600 tons of ferro-tungsten; (6) aluminium works designed for an annual production of from 15 to 20,000 tons; (7) fire-brick works with an output of 30,000,000 bricks per annum; (8) slag-cement works with a yearly output of 2,500,000 barrels; and (9) central repair works. The scheme also includes the building of several villages for housing employés. Provision for irrigating the surrounding steppe has also been made. The estimated cost of the whole undertaking is 800,000,000 roubles (£85,000,000 at par).

Mr. A. V. Winter, chief of the Joint Construction Works, who has been responsible for the erection of the new hydro-electric station

The construction of the hydro-electric station was completed on May 1st last, when the first generating unit was started.

The scheme in its present form for harnessing the rapids on the River Dniepr by means of one dam was suggested and worked out by Prof. I. G. Alexandrov. Construction was commenced on November 7th, 1927. Mr. A. V. Winter was appointed chief engineer and Messrs. Hugh L. Cooper & Co., of New York, were requested to act as resident consulting engineers.

Situation of the Power Station

The site of the hydro-electric station is near the town of Zaporozhye (formerly Alexandrovsk) by the now flooded village of Kishkass. At this point the Dniepr makes nearly a right angle turn, about 1¼ miles from which the rock bed of the river rises to the highest levels forming the rapids. It was decided to erect the dam and the power station upon sites in this area. Both banks of the river are composed of rock.

The power house proper consists of nine blocks 72 ft. long for the main generating units, and of the erection platform, 108 ft. long, at the bank end of the station, where the auxiliary turbo-generator is also accommodated. The machine room is 760 ft. long, 67 ft. wide, and 59 ft. high, and is equipped with two 260-ton cranes.

In the solid concrete of the underwater part of the power house building are arranged the suction tubes, which are subdivided in the horizontal bend by a small pier. Above the suction tubes are placed the spiral casings made of riveted steel, completely cast into the concrete of the underwater part, on which rest the foundations of the generator. The machine hall floor is raised to the level of the upper edge of the stator, so that above the floor are situated only the upper spider with its bearing and the auxiliary generator mounted on the top. The cooling equipment of the alternators, turbine governors, oil and water pipings, &c., are accommodated in the two basements provided on two levels between the casing block and the floor.

Generating Plant

The nine water turbines were supplied by the Newport News Co. of America. At the specified head of 116.5 ft. and the maximum efficiency of 91.8 per cent., the capacity of each turbine is 85,000 h.p. The guaranteed average efficiency at this head is not less than 90.6 per cent., when working between 67,000 and 91,000 h.p. The runaway speed is 1.75 of the normal, which is 82.25 r.p.m. The weight of the turbine without the pressure piping and governor is 660 tons; the maximum diameter of the runner is 19.7 ft.

Five 77,500-kVA, 13,800-V alternators will be manufactured by the General Electric Co. of America and four by the "Electrosila" Works in Leningrad. The weight of each alternator is 780 tons; the rotor, with its shaft weighing 430 tons, has a diameter of 33.5 ft.; the outside diameter of the stator is 42.6 ft.

A good idea of the magnitude of the undertaking is obtained from this picture of the Dnieprostroi Dam, which is illuminated at night by high-power lamps

An auxiliary 750-kVA, 2,300-V alternator with its 37-kW, 250-V exciter is mounted on the shaft of each main alternator.

A stage in the construction of the second turbine

This auxiliary alternator feeds the motor of the main exciter set and the oil pump motors of the governor. The main exciter set comprises an induction motor of 575 h.p., 2,200 V, 985 r.p.m., an exciter of 375 kW, 250 V, and sub-exciter of 4 kW, 250 V, both compound wound.

The Main Step-up Sub-station

The main transformers are installed out of doors near the power house wall and the remaining 161 kV equipment on the opposite side of the forebay on a platform. A steel-aluminium conductor of special construction spanned over the forebay connects the transformers with the switchgear. The 161-kV bus-bars are composed of copper tubes, 4.33 to 3.94 in. diameter, fixed on post-type insulators. Practically all the connections between the main bus-bars and the switchgear are made of flexible copper conductors.

There are nine main transformer banks, each consisting of three single-phase oil-immersed forced-cooled non-resonant core-type transformers of 26,000-kVA capacity, ratio 13,200/161,000 V, delta-star connected. On the high-voltage side there are two +2.5 per cent. and two −2.5 per cent. tappings, which can be connected, when the transformer is disconnected from both sides. The short-circuit voltage is 13.5 per cent., regulation 1.8 per cent. at unity p.f., and 10 per cent. at 0.8 p.f. The weight of a single-phase transformer with oil is 62 tons. The high voltage winding has graded insulation and the neutral point is earthed through an impedor, consisting of a capacity with which a resistance is connected in parallel through a spark gap. One high-voltage terminal is insulated for 161 kV and the other connected to the impedor for 92 kV.

The main 161-kV equipment of the sub-station comprises: (*a*) Motor-operated oil switches of 2,500,000 kVA rupturing capacity; each phase of the switch is contained in a round tank of 6.5 ft. diameter, rigidly fixed to the foundations; the distance between phases is 7.5 ft.; the current transformers and capacity potential transformers are contained in the terminals; (*b*) motor-operated isolating switches with blades opening upwards; the distance between phases is 14 ft., approximately the same as between conductors; (*c*) oil immersed water-cooled reactors of 125,000 kVA capacity and 10 per cent. reactance. Lighting arresters have not been installed, although the necessary room is provided.

Control, Earthing, and Protection

The whole of the control equipment is accommodated in a separate building situated close to the main sub-station. This building is one storey high (ground floor) above the level of the sub-station on one side, and four storeys on the opposite (downstream) side. The main switchboards and operating desks are accommodated in the ground floor on one side of the stairway, on the other side of which are stationed the load dispatchers. On the remaining floors are accommodated the 2,300-V switchgear, telephone station, control cables, battery, laboratory, pump room, offices, &c.

The earthing arrangement consists of a circuit placed in the lower water and anchored to the rock. The turbine racks are also connected to this circuit. At the main sub-station the earthing is effected by means of a 1¼ by ⅜ in. galvanised ribbon laid in the ground and connecting 200 electrodes, made of galvanised iron tubes measuring from 6.5 to 10 ft. in length.

Differential and earth protection is provided for each generator; the neutral points of the generators are earthed through a non-inductive resistance of 80 ohms, which will limit the earth current to 100 A. In addition, each generator is provided with a temperature relay.

Each main transformer is provided with differential and overload protection, and Buchholz relays will be fitted to the tanks.

The differential relays, which are of the balanced type, and the earth and Buchholtz relays act on the tripping coil of the transformer oil switch and at the same time bring into action the field suppression equipment of the alternators.

The Transmission System

The alternators are directly connected to their respective transformers by bare copper bars. The duplicate main bus-bars are on the 161-kV side of the transformers. In addition, there is a 2,300-V double bus-bar system for service and local supplies, to which is connected the 3,500-h.p. auxiliary generating unit (of Russian manufacture), accommodated under the erection platform. An alternative supply is provided from the main bus-bars through two 6,000-kVA 161/2.7-kV self-cooled transformers.

The 161-kV bus-bars are divided into three sections, coupled through reactances, star connected in accordance with Stott's system. Each section has its own bus-bar coupler oil switch. The working voltage of the system is 154 kV, but the equipment is designed for 161 kV.

There are two outgoing circuits from each of the adjacent sections of the 161-kV bus-bars. These circuits close on the site of the "Dnieprokombinat" into two rings 11.9 miles long. To these rings are connected the sub-stations at the aluminium, ferro-alloys, and metallurgical works. These sub-stations have double bus-bars, but each system of bus-bars can be connected to one ring only. Normally one-half of the transformers is connected to one ring and the other half to the second ring. All the transformers can be connected to one ring, but the interlocking of the isolating switches prevents the paralleling of the two systems of bus-bars.

To the third section of the bus-bars are connected the following lines: (1) two circuits, each 140 miles long, to a sub-station at Rykovo in the Don Basin, containing 100,000 kVA compensators; (2) two circuits, each 40 miles long, to the Junction sub-station in Dniepropetrovsk and thence for another 25 miles to the sub-station of the Regional station in Kamenskoe; (3) one circuit 38.5 miles long to the sub-station in Nikopol, which is then continued for another 50 miles to the sub-station of the thermal power station in Krivoi Rog. In addition, a local ring is formed in Dniepropetrovsk. A new power station is projected in N. Alexandria, in which case the Dniepr lines will close through this station into the so-called "Western Ring" 253 miles long. If this is not realised, the Western Ring will close through the line connecting Kamenskoe and Krivoi Rog.

There will be eleven step-down sub-stations connected to the 154-kV network. Eight, equipped with 800,000 kVA of transformers, will be completed during 1932 and the remaining three with 430,000 kVA of transformers during 1933.

The Present Stage

Three generating units have already been put into commission. The fourth unit is being dried out and the fifth set will be ready in the early autumn. The principal consumers are not yet ready to receive energy, and the machines are loaded only to about 20,000 kW, of which 12,000 kW is transmitted to the Junction sub-station in Dniepropetrovsk and 8,000 kW is consumed on site.

The 154-kV transmission line from the main step-up sub-station to the Junction sub-station in Dniepropetrovsk has also been completed and is already working, as well as some of the step-down sub-stations and part of the local ring in Dniepropetrovsk. The 154-kV transmission line across the Dniepr to the left bank has been virtually completed, and it will shortly be possible to supply electricity to the works of the "Dnieprokombinat" and also to Zaporozhie.

A description of the Dniepr hydro-electric power scheme by P. P. Laupman and V. A. Tolvinsky was published recently in the *Electrichestvo*, from which the main data in this article have been drawn. Our thanks are due to Intourist, Ltd., and the British Russian Gazette & Trade Outlook, Ltd., for illustrations used in this article.

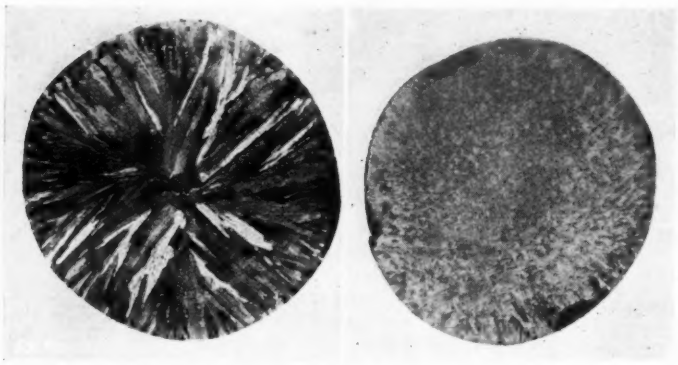
Electrical Resistance Alloys.

By W. F. Randall, A.R.S.M., B.Sc.

The application of the induction furnace in their production

IN the nickel-chrome and nickel-chrome-iron alloys designers of electrical heating equipment have reliable and well-established material, the development of which has assisted greatly in the progress of electrical-heating devices. Owing to the resistance of these alloys to oxidation, and to their high electrical resistivity, they are used to the exclusion of almost all other material for such work and, although progress is being made with other types (based generally on Fe-Al alloys) which may result in a cheaper and more resistant material, they seem likely to maintain the premier position in this field.

The metallurgist, in developing from straightforward Ni-Cr or Ni-Cr-Fe mixtures, a homogeneous, malleable, and ductile alloy with reproducible qualities, has had to resort to various additions which make the marketed Ni-Cr far from "pure." "Purity" is, of course, a relative term, but the nickel-chrome alloys usually encountered in industry must be classified as at least quaternary alloys to fall within the scope of this term at all. This departure from binary purity has been inevitable and the accepted standards for resistance wires are based on such material, but there is no doubt that the additions, although essential until recently from the metallurgical point of view, do detract from the heat-resisting qualities.



Left: A badly cast ingot showing radial crystallisation and cracking. Right: An ingot cast under correct conditions

The Induction Furnace Speeds up Progress

With the advent of the electric induction furnace, however, a new method of melting became available and allowed the development of fresh technique in the manufacture of nickel-chrome, giving an alloy approximating much more closely to binary purity. Consequently a more reliable, more homogeneous, and more heat-resistant alloy can be obtained. The cause of ultimate failure is generally due to local non-homogeneities. The smaller the number of variable factors, the less the probability of difference in composition from point to point, so that by the elimination of additional elements in solid solution the possibility of local variations is very much reduced. How is this elimination made possible and in what manner does the induction furnace affect the quality of Ni-Cr produced by this method of melting?

In the first place it should be borne in mind that defects in wire are often traceable back to the ingots from which the wire was drawn, or even further to the metals used for the melt from which the ingots were made. The chrome must be as free as possible from oxygen and carbon. It has been found that chrome produced by "Thermit" reduction is the best material from this point of view. If chromium oxide exists in the raw material it is practically impossible to eliminate it from the melt, and its presence in the ingot brings disaster. Nickel may contain as impurities sulphur, carbon, oxygen, or copper. All of these must be avoided to obtain the full benefit of induction melting, and in nickel produced by the carbonyl process (*i.e.*, Mond nickel) we have raw material free from such impurities.

A fruitful cause of trouble in the early nickel-chrome alloys was incomplete mixture during melting, so that parts of the ingot as cast had a greater chrome content than others. This condition persisted right through the reduction of wire and gave variations in the final product. With induction melting the occurrence of this defect is practically impossible, the stirring due to the electro-magnetic action of the high-frequency current ensuring homogeneity of the bath of metal. There does not appear to be any other method of melting in which such effective mixture can be achieved.

Sealing the Charge

During melting, and when molten, nickel-chrome melts are very ready to absorb gases from the air and to oxidise superficially. It is essential therefore that the surface of the metal should be exposed as little as possible, as once chromium oxides, formed at the surface of the metal, are drawn into the melt it is very difficult to remove them. With the induction furnace it is possible to charge up and cover completely with a slag of required composition with the knowledge that the metal will run down under the slag without further disturbance, the feature of this type of furnace being that heat is generated in the metal itself. With other methods of melting this is not possible, so that it is found necessary to add carbon and manganese to the bath to combat the effect of oxygen absorbed or combined.

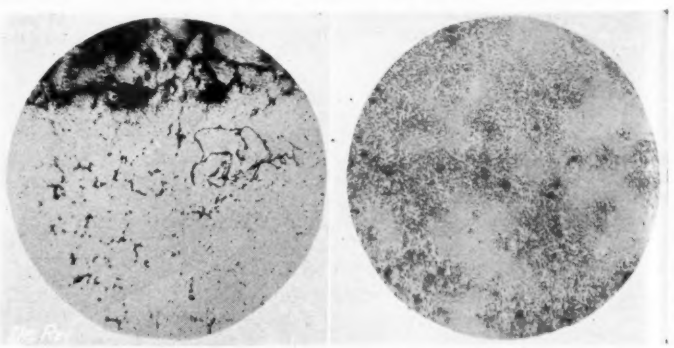
Manganese being an element of lower melting point than nickel or chromium, the result of its addition, which may be up to 2 per cent., is a lowering of the solidification point by about 20 degrees C. on 80/20 Ni-Cr. This is disadvantageous in that the metal requires a longer time for solidification in the ingot, and rapid freezing is an important factor in the production of good ingots or castings for furnace parts. Carbon is very effective in preventing unsoundness due to gas absorption and the formation of chromium oxide. Although it has been considered essential for this purpose, its presence in nickel-chromium is definitely detrimental, and by dispensing with such an addition the resistant qualities of the alloys are much improved.

Whether the cast ingot will forge and roll satisfactorily is dependent very largely upon casting conditions. A definite super-heat must be adhered to, and only by close pyrometric control can full success in casting be achieved. During teeming, superficial oxidation of the metal stream takes place and a steady rate of pouring must be maintained in order that this superficial oxide is not taken into the ingot. The rate of pouring and the design of the ingot mould must be carefully chosen to discourage radial crystallisation, for the metal has a very strong tendency to crystallise in this way.

Photomicrographs reproduced herewith illustrate the markedly radial structure associated with bad forging qualities and the equiaxed grain structure of well cast material. Rod rolled from an ingot with the former structure will inevitably show hair cracking in the surface.

Hot-working Precautions

During hot-working the ingots require care, the increase in hardness on cooling to a red heat being liable to cause internal cracking if working on large sections is carried on over this range. The increase in hardness is more marked in alloys with a high carbon content so that its absence improves the working qualities.



Left: Surface of 80/20 nickel chrome attacked by sulphur. Right: 80/20 nickel-chrome containing carbon

During hot-working precautions must be taken to ensure that billets are kept free from pollution, the sulphurous atmosphere met with in gas furnaces being particularly deleterious. Sulphur attacks the billet by combining with nickel to give a low melting point sulphide which penetrates

Limestone Quarrying

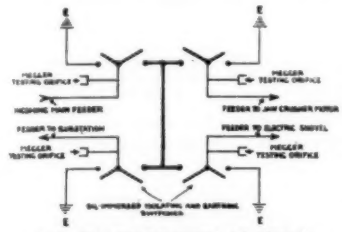
A "heavy" electrical application

IN the quarrying of limestone extremely robust and absolutely weatherproof equipment is essential. The apparatus must also be simple; small complicated parts are to be avoided because any breakdowns must be dealt with on site.

At the quarry of Messrs. G. T. Earle, Ltd., Hope, Derbyshire, electric power is used for all the operations*. The quarry is situated on a hillside about 800 ft. above sea-level, and electricity is brought to it by means of a 3,000-V tail-end cable, which is terminated at the switchgear illustrated. Any or all of the four cables connected to this switchgear may be isolated and earthed, and testing plugs can be inserted for insulation tests or other purposes. The isolating switches are designed to make or break full-load current at the rated voltage, and a complete set of interlocks ensures that operations are carried out in the correct sequence.

The switchgear is of very simple construction, and unlikely to be damaged by rough handling. One cable from the switchgear goes direct to a 500-kVA transformer in the quarry substation, and the other two go to a jaw-crusher motor and to an electric shovel.

This shovel is fitted with caterpillar wheels for moving about the quarry. The trailing cable gave rise to considerable difficulty in designing the layout of the equipment. The total output of the motors is about 500 h.p., and a cable for low voltage would have been costly and unwieldy; 3,000-V motors controlled by a novel form of specially constructed switchgear were therefore installed.



General arrangement of circuit

This switchgear is mounted on skids, so that it can be moved about easily without hampering the movement of the shovel

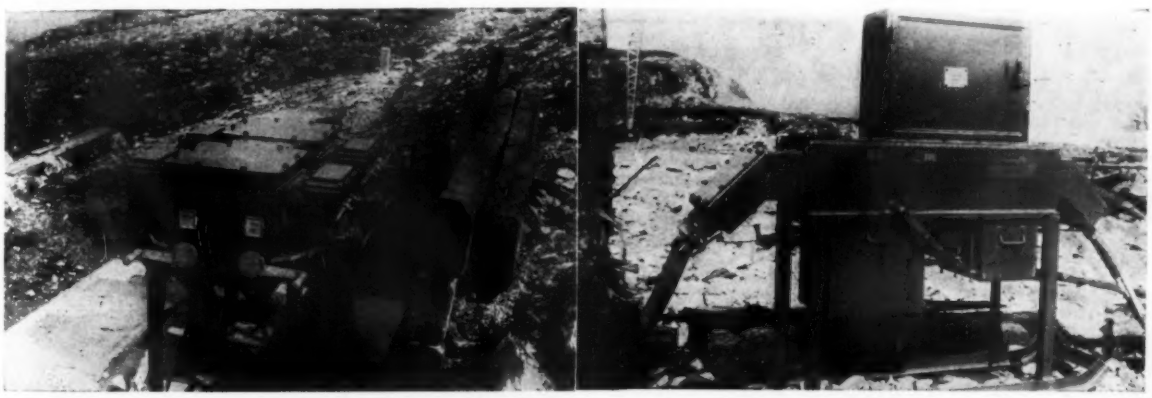
Electric shovel fitted with caterpillar wheels

It can be lifted bodily with its carriage on to a trailer behind the shovel, and transported to any part of the quarry.

The cable from the main distributing switchgear is led to a sealing-box mounted at one end of the carriage of the portable switchgear. The current then flows through current-transformers, a fully-automatic circuit breaker, disconnecting-links, and a sealing-box fitted with a gland suitable for taking the pliable armoured trailing cable for the motors on the shovel.

The switchgear carriage contains a voltage-transformer for supplying the voltage-circuit of a watthour-meter mounted on the top of the carriage; over-current and earth-leakage protection and an under-voltage release are also provided. After removing the disconnecting-links the sealing box to which the pliable-armoured cable is connected may be detached from the switchgear without interfering with the sealing of the cable. This makes it easy to connect different lengths of flexible trailing cable between the portable switchgear and the shovel.

All the high-voltage connections of the portable switchgear and of the switchgear at the end of the main cable are either oil-immersed or embedded in solid bitumastic compound to ensure that the moisture-laden atmosphere will not cause a breakdown.



Main distributing switchgear and portable switchgear for shovel

The equipment shown in the illustrations is the first of its kind in England. The switchgear referred to was manufactured and supplied by Messrs. A. Reyrolle & Co., Ltd.

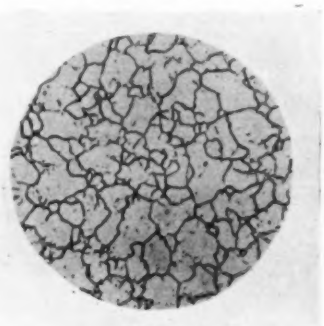
* See also ELECTRICAL REVIEW, January 3rd and 10th, 1930.

Electrical Resistance Alloys *(concluded from preceding page)*

into the metal along the grain boundaries causing a weakness which develops into cracks or spills during later reduction. The best practice therefore is to pre-heat these alloys either in a muffle furnace or in electrically heated furnaces. Such electric furnaces, heated by induction-melted nickel-chrome resistors, are being successfully employed for this preheating, temperatures up to 1,200 degrees C. being maintained. The penetration of sulphur along the grains of material heated in a sulphurous atmosphere is clearly shown.

To return to the effect of carbon, two figures are given showing the structure of an alloy free from this element, and the other containing a few tenths of 1 per cent. Carbon is not particularly soluble in a nickel-chrome solid solution; and, as the solubility varies with temperature, any carbon present is dissolved or precipitated according to circumstances when the metal is heated or cooled, thus acting as an internal disintegrator contributing to the mechanical breakdown of the wire and, incidentally, increasing the "creep" of the wire while in use. At the same time the presence of areas rich in carbon, due to uneven distribution of the element, are the cause of hot spotting.

Nickel-chrome alloys manufactured with due regard to the factors mentioned in this article have been made and used in heat treatment processes involving furnace temperatures of from 1,150 to 1,180 degrees C. This implies a resistor temperature of 1,250 degrees C., and, even under these extreme conditions, the resistors have given good service, completely vindicating the somewhat elaborate precautions taken during production. The alloys are marketed under the trade names of "Pyromic" and "Calomic," and are manufactured by the Telegraph Construction and Maintenance Co., Ltd., to whom the author is indebted for the accompanying illustrations.



A carbon-free alloy

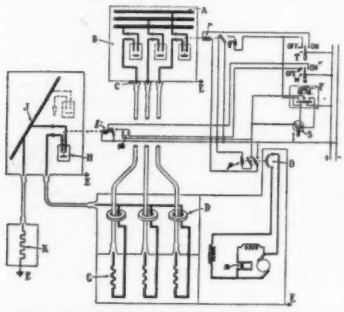
Automatic Alternator Protection

MESSRS. A. REYROLLE & Co., Ltd., Hebburn-on-Tyne, have introduced alternator field-breaking apparatus which will meet the following conditions to prevent sustained arcing in the event of a fault in the stator windings:—

The protective relay immediately disconnects the alternator from the bus-bars and completes the trip circuit of the field circuit breaker. It is not possible for this circuit breaker to open until the alternator breaker has opened. The field breaker only operates on the occasion of an alternator fault—not when the alternator breaker is operated deliberately.

The control circuits are so arranged that the field circuit breaker is closed before the alternator circuit breaker is closed, and that the alternator breaker is opened before the field breaker is opened. An emergency trip device, if employed, apart from the control board, operates the field circuit breaker as under fault conditions. The alternator neutral switch opens simultaneously with the field circuit breaker under emergency conditions, but is normally capable of independent hand control.

The diagram indicates the arrangement of alternator protection with Reyrolle field-breaker equipment, the letter referring as follows:—A, main bus-bars; B, main oil-break circuit breaker; C, alternator cable-gland insulated from earthed switchgear frame; D, self-balance current-transformers (secondaries connected to winding of relay F) for self-balance protection against cable-fault; F, relay, with armature operated upwards by self-balance protection, and downwards by hand release for routine testing—the latter does not trip the field switch; G, alternator stator-winding; H, solenoid-controlled oil-break circuit breaker for neutral; J, neutral bus-bar common to all generators; K, earthing-resistance; I, closing-solenoid for neutral circuit breaker; m, trip-coils for hand and automatic control of neutral circuit breaker; n, exciter shunt-field regulator; O, alternator field circuit breaker; p, trip-coil operated from relay F and emergency-switch S for field circuit breaker; q, main circuit-breaker trip-coil; r, closing solenoid for main circuit breaker; S, emergency-control switch near alternator for opening main circuit breaker, field circuit breaker, and neutral circuit breaker in succession; T, remote-control switch for main circuit breaker; u, remote-control switch for neutral circuit breaker.



Arrangement of alternator protection with Reyrolle field-breaking equipment

Standard pedestal housing field-breaking equipment

When the protective relay (see diagram) is operated electrically the three upper contacts are closed, but the two lower contacts only are closed under hand operation. A s.p. air-break magnetic blow-out switch with a shunt trip coil effectively and rapidly quenches the arc, and is usually mounted in a cast-iron pedestal. It is generally arranged for hand closing, the handle being accessible through the glazed door in the front of the pedestal, but a remotely controlled solenoid-operated breaker can be fitted. Either type can only be tripped electrically, from the relay or from the emergency trip. The magnetic blow-out circuit breaker may be replaced by a carbon-break switch, but with a longer period of arc maintenance and consequently stator voltage.

Where a discharge resistance is necessary to relieve stresses on the rotor insulation the field circuit breaker may be either of the air-break or drum type, the contacts being so arranged that the resistance is connected across the rotor windings before the exciter circuit is broken. The standard pedestal equipment is designed, primarily, for mounting near the alternator, and it is suitable for accommodating various indicating and control devices, &c.

Telephones in Ceylon

TELEPHONES were first installed in Ceylon about thirty-five years ago, in Colombo, the capital of the island. The system was magneto operated and is still largely so. The real development started about twenty-two years ago, when cables in Colombo were laid underground, and now the whole island is covered with a network of lines, except on the south-east side. At present there are 7,976 subscribers in all, 4,000 of whom are in Colombo. The number is decreasing, entirely due to the depression. The telephone system is owned and operated by the Government.

There are 231 miles of cables with a wire mileage of 35,000 and 2,500 miles of trunk wiring, making a total of 3,608 loop miles. The system is mainly overhead with concrete poles made locally, but a number of tubular iron posts have also been used; wooden poles cannot be used because of white ants. Coconut trees falling down are responsible for most of the breakdowns, and cyclones, which occur between October and November, play havoc with the aerial routes.

There are 117 telephone exchanges in various parts of Ceylon, of which forty to fifty are central battery, six automatic, and the rest magneto. The automatic exchanges range from fifty lines as the minimum, to 100 as the maximum. They are purely for Government departments and are experimental to pave the way for eventually converting the whole system to automatic switching. With this end in view the authorities purchased one of each system (G.E.C., Standard, Strowger (A.T.M.), and Relay) for experimental purposes.

There are two main exchanges in Colombo, and numerous small ones. A mixture of equipment is used, though the policy is gradually to replace the small magneto exchanges with the central battery system and then finally make them automatic as conditions improve. All equipment has a tropical finish, as in Ceylon there is 90 per cent. humidity all the year round.

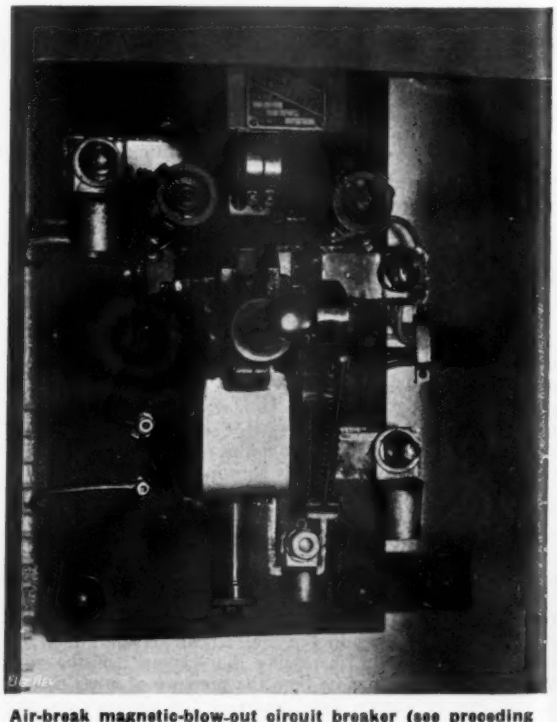
The Training of Operators

Whilst telephone installations are imported, many parts are made locally in the workshops of the telephone service in Colombo. All the labour is native, with European engineers in charge. The Government has a very well equipped training school.

Many exchanges in Ceylon range from twenty to 200 lines, and one operator is employed when the number does not exceed 100, and two where more than that figure. Operators are trained in the Central Exchange building in Colombo, and their work compares very well with that of manual exchanges in Europe. The calling rate is higher than in London, and, due to the limited capacity of the switchboards, the operators have more lines to handle.

The language used is chiefly English, but operators must also know Singalese. The girls work in shifts of six hours, starting at 7 in the morning, and the men through the night, starting at 8 p.m. Some 75 per cent. of the telephones used in Ceylon are desk instruments, which are preferred. Rates range from 120 and 180 rupees (non-business and business respectively) in the large towns, such as Colombo, Galle, Kandy, and Nuwara Eliya, to 90 and 125 rupees in the small towns for a distance of two miles or under from the exchange. An additional charge of 10 to 25 rupees is made for every additional half-mile or portion thereof.

W. BUCHLER.



Air-break magnetic-blow-out circuit breaker (see preceding article)

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Waste Insulating Material

Although good test room performance is desirable in insulating material, reliability during long service in difficult working conditions is its best quality.

In the article on page 314 of your September 2nd issue Mr. Dickson encourages the use of pulverised waste insulating material, presumably "Bakelite" mouldings and scrap mica, as a suitable addition to synthetic resin moulding powder for reducing the price. As waste material nearly always contains metal, spotty mica, moisture, oil and other undesirables, by the time it is pulverised it cannot add to reliability of the one material which really matters in electrical gear. It is only in exceptional cases that pulverised scrap is cheaper than the normal filling material, wood meal, in these powders, and in no case can it make a good moulding powder. Some of the low quality Continental mouldings which contain scrap adulteration are evidence of this.

One of the considerable costs in manufacturing moulding powder is that of maintaining regular and reliable products with the aid of both chemical laboratory and testing plant. Added scrap would increase this cost. Neither wonderful presses nor the use of scrap material are the causes of low Continental prices, and the British moulder does produce a sound job at a scandalously low price in successful competition with foreign goods.

If ground scrap insulating material could be used in the apparently simple way described in the article, it would give the electrical engineer less anxiety if it were moulded into ash trays. The use of old ELECTRICAL REVIEWS for the manufacture of laminated sheet and tube insulation is not suggested in the article, but it would make the job of the assembler less monotonous if he were permitted to select the pages which were better covered up.

A. W. ROWELL

Birmingham, *September 12th.* (Ellison Insulations, Ltd.).

Dangerous Wiring

Having been requested recently to examine the fuses of a private house installation I found a piece of wiring which shows the habits of the supposed qualified "one-man" electrician.

The case in question was the provision of a mains supply (240 V a.c.) to a wireless set. Connection to the fuse-board was made by about two feet of cab-tyre flex. This was taken to a tumbler switch fastened directly to the wooden partition of a cupboard under some stairs. From here the supply was continued by a light red and black flex, unbraided and with very thin rubber insulation, looped through two door frames and then carried round a picture rail from which dangled a cord grip lampholder forming the connection to the set. The whole of the fixing was by bare staples and no allowance had been made for closing the doors. The floors are laid either with tiles or cement composition and I found that it was possible to get quite an unpleasant shock by merely touching the staples.

I learnt with surprise that whilst this extension had been in use for over a year, the only mishap had been a short-circuit under one of the doors about Christmas time, since when the occupiers had deemed it advisable not to shut the door!

Comment of course is needless, but one feels that there are many similar cases in which householders are oblivious of the dangers of not having extensions for wireless cabinets, clocks, &c., carried out by a reputable firm of contractors.

September 7th. C. B.

The British Industries Fair

The letter from Mr. G. Barnes which you published in your issue of August 26th, relative to the holding of the British Industries Fair in February, strongly supports the contention

One of the immense rotors at Dnieprostroi (see page 388)

which the Cable Makers' Association has laid before the management of the Fair for several years, that if the purpose of the Fair is to increase overseas business, then it is useless to hold it in February for the reasons which Mr. Barnes so clearly sets out.

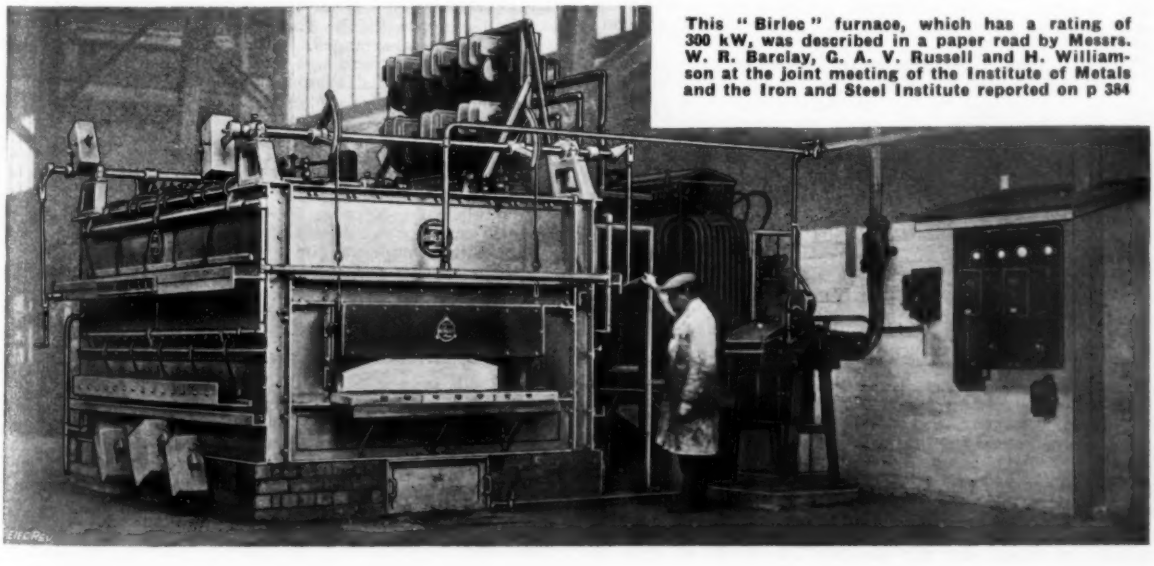
The matter has, of course, been discussed in the electrical industry and a vote of exhibitors has been taken, and I believe it was on the result of this vote that February was again decided upon. From this it seems that the majority of exhibitors are satisfied, but it must be pointed out that they largely cater for the home trade, and it would appear that the great expenditure incurred by the Board of Trade in advertising the Fair overseas is an unnecessary expenditure since the exhibition is now running for the benefit of the home industry.

London, W.C.2, *Sept. 9th.* THE CABLE MAKERS' ASSOCIATION, L. B. Atkinson, *Director.*

The Effects of Electric Shock

The various letters in your journal regarding the effects of electric shock have made very interesting reading. It would be of value to learn from the medical side what influence the general constitution and state of health of the victim has with regard to the immediate and subsequent effects.

In my own experience, although I have twisted the two



This "Birlec" furnace, which has a rating of 300 kW, was described in a paper read by Messrs. W. R. Barclay, G. A. V. Russell and H. Williamson at the joint meeting of the Institute of Metals and the Iron and Steel Institute reported on p 384

bare ends of a 220-V a.c. circuit, while standing on an iron floor of an electric shovel, I have never received or felt a shock, beyond a slight tickling sensation, owing, I think, to my being in perfect health. Yet I have seen a native of poor physique trying to copy my practice drop dead in front of me.

In another case a native foreman was given instructions to open and make dead a 5,000-V switch cubicle on a mine feeder. Being too lazy to do this himself he told off a native electrician for the job, handing him an insulated pole with which to pull the knife switches. This man, who was of fine physique and in perfect health, opened the doors, took out the oil switch, seized a bare knife switch with his bare hands, and pulled it out. He received no shock, and operated the middle phase with the same negative result. On pulling out the knife switch of the last phase, however, he was killed outright. The ground was stony and dry, situated at an altitude of 9,000 ft.

Bude, *September 10th.* CLINTON CATER.

I read with interest, and even a little amusement, but for the main part with a feeling of reproach the varied correspondence which has appeared in the REVIEW on the question of shock from electrical installations. Reproach, because the fear of shock should be eradicated, if the use of electricity is to be extended to all.

Why we engineers do not tackle the question logically and find a solution is beyond comprehension. The suggestion of educating the public only in part solves the problem. An obsession is rife at the present time that if a man does not want to buy your goods or adopt your ideas the poor ignoramus must be educated up to them. But fancy educating people up to the fact that they cannot know enough about electricity because it can be dangerous!

A sugegstion, which I realise has been presented before, is to lower the voltage for domestic use. I also realise that this would involve scrapping a lot, if not most, of the present equipment. Lamps would have to go, but most other fittings and appliances could be advantageously adapted.

I myself have had an experience similar to, if not more intense than, that of one of your recent correspondents on this question, having unwittingly taken a voltmeter out of circuit, where it had been on test on a d.c. supply, immediately placing myself in circuit. By all laws for the preservation of testers I was entirely to blame and no doubt would have succumbed if I had not had sufficient presence of mind to kick up a fuss and so break the circuit.

The point I wish to establish is that it was d.c., and I must have quite a reasonable figure of internal resistance; for although the voltmeter had previously only been "warming up" at a low figure of about 100 V or so, this was maintained by a controlling resistance in series in the main supply which was well over 400 V! Has the import of one's own resistance been sufficiently considered in d.c. installations?

To tackle the question of protection for the a.c. consumer I can only reiterate that low voltage must be established from the consumer's terminals. A conveniently situated step-down transformer must be used if the present system of round about 230 V house-to-house distribution is to be retained, and I see no reason why it should not be. Then it remains for lamp research to give us more lumens per watt in the lower voltage bulbs or, more conveniently, adapt their automobile lamps. CYRIL H. RENNELS.

Brixham, *September 12th.*

The Approval of Appliances for Canada

Regarding your remarks on the list of approved apparatus just issued by the Hydro-Electric Power Commission of Ontario, it may be of interest to mention that approval by the Underwriters' Laboratories of Chicago is accepted throughout Canada, and therefore many firms who have this approval have not found it necessary to get further approval from the H.E.P.C. This may account for the omission of some names from the list. In our own case, for instance, we have the Underwriters' approval

In the main, however, you are right in assuming that there are not many English firms who have received any approval on apparatus for use in Canada, and this I am afraid may be due to lack of interest in that market. Some time back I suggested to the B.E.A.M.A. that they should acquaint themselves with the conditions underlying approval, but they decided that there were too few of their members interested to make it worth while for the Association to take a hand.

For VENNER TIME SWITCHES, LTD.,
Ernest E. Sharp, *Director.*

New Malden, *September 13th*

The Improved Model of the "Everhot"

THERE is much to be said for waterless cooking from the health point of view; the food is cooked in its own juices, instead of in water which carries with it a large proportion of the nutritive value when it is drained off.

The "Everhot" is a complete unit, circular in shape and heavily lagged, that can be used to roast, bake, fry, boil, steam, and stew without smell, as well as for the making of jam; it is designed to cook a complete meal in one operation, and also, if required, to enable the meal to be transported for a picnic and eaten hot many miles from home. As there is no cold air circulation the food does not lose condition. As a secondary use it can be turned into a freezer during hot weather.

Hitherto an American model only has been available, and this was the one referred to in our account of the civic exhibition in Cardiff during the recent I.M.E.A. Convention. Now a British-made model is being placed on the market, and we have inspected one of the first examples at the offices of the Everhot Electric Co., Ltd., 9-15, Oxford Street, London, W.1.

A Low Maximum Demand

The British model seems to us to be a distinct improvement on its predecessor, both technically and in appearance. The capacity has been increased in the larger model (which is said to be capable of providing a meal for from nine to ten people), and its dimensions are 15 in. by 15¼ in. overall, and 10¼ in. by 12 in. internally, and its weight 28 lb. At the same time the loading has been reduced to 600 W on high heat (the maximum allowed from a b.c. lampholder), and 100 W on low heat; in the models originally put on the market the loading was 750 and 150 W.

An ingenious combination of a pin and plug in the adaptor enables it to be connected either to a lampholder or a plug point. The element is in the form of a spiral wound round the barrel in the heat insulatory space; it is supplied for any voltage above 100.

The change-over from high to low heat is carried out by reversing the broad, flat, three-pin connecting plug, on the side of which a rubbing earth contact is made.

The new cooker looks much more robust, and has got away from the milk-pail appearance of the American model. The standard finish is in grey mottled enamel, but any colours can be supplied; metal work is of stainless steel. The cover is flush with the top.

Three feet form part of the frame, and pins on these enable the cooker to be used on its side without movement for baking, in which case any tendency for the lid to come off is restrained by a clamp. A chain handle is now provided. Any excess pressure is relieved through three slots cut in the side of the cover.

Energy Consumption

In course of conversation, Mr. R. H. Rogers, sales director, told us that the cooker would take a 6 lb. joint easily at the bottom; three containers for vegetables on a wire trivet formed the first storey, and above these a round pan could be used, for example, for Yorkshire pudding. If the elements had been at the bottom, the joint would have formed an impenetrable baffle. The normal cooking time was twenty minutes at high heat and thirty-five minutes at low, giving a total consumption of 250 Wh. Food could be kept hot for four or five hours after switching off; alternatively, the user could go out all day and leave the cooking to look after itself by leaving the 100-W element in circuit for from eight to ten hours.

For baking, with the cooker on its side, two or three shelves could be arranged. After use, when the gravy had been poured out, there was enough residual heat to provide hot water to wash it thoroughly, particularly as there were no corners to clear of grease, &c. The retail price has been provisionally fixed at £9 7s. 6d. for the "de luxe" model of the "Everhot."

A smaller model is also being made for four or five persons with loadings of 500 and 100 W. Its internal dimensions are 9 in. by 9 in., and external 13 in. by 12 in.

The elements carry a two-years' guarantee, and subsequently cost 10s. 6d. to replace.

One thing that especially appeals to us in this cooker is that it represents a courageous attempt to wean the consumer from apparatus that owes its design and appearance to older methods of cooking, and to take an electrical line of its own. It should find a field more particularly where supply conditions (such as in outer suburbs and rural areas) make a low loading desirable.

Electrical Standardisation in France

The French Union des Syndicats d'Electricité has lately appointed committees to draw up standard specifications for a.c. oil circuit breakers for pressures over 1,000 V, and silk and cotton-insulated wire for electrical machine and apparatus windings.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Clamped-element Safety Kettle

A new safety kettle has been added to the range of "Magnet" appliances supplied by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. It is made of heavy gauge copper with a tinned interior and the exterior is finished in nickel plate. The element, which is of nichrome resistance ribbon, is clamped to the base of the kettle by a different method from that usually employed, thus dispensing with the use of studs. The safety device is operated by the expansion of a bi-metal strip fitted to a block on the underside of the kettle bottom, and is reset by depressing a knob projecting through the skirt of the kettle, which is seen in the accompanying illustration.

The new "Magnet" kettle

The feet of the kettle are heat insulating and the connector has an earth contact with a three-core flexible which is unkinkable. The handle is of ebonised wood, the bolt extending through the entire length of the handle. The price of the 2-pint, 650-W model, as described, is 30s., and that of the 3-pint, 1-kW model, 34s. 6d. Non-automatic kettles without an earth contact are available at 25s. 6d. and 30s. for the 2- and 3-pint sizes respectively.

The Ulz Insulation Stripper

A machine for stripping the insulation from the ends of electric wires quickly has lately been put on the market by ARTHUR ULZ, WERKSTATTEN FÜR PHYSIKALISCHE UND CHEMISCHE APPARATE, Berne, Switzerland. The method of operation is that of burning off the insulation, the makers claiming that in this way any risk of damaging the wires is obviated, the burning being effected by two electrically heated metal rods. The wire or cable is placed on the lower rod, the upper rod being then lowered on to the wire by motor-driven gearing. An adjustable stop is provided to vary the length of the insulation removal.

In the electrically driven machine a current of cold air is made to pass directly in front of the rods and so protects the operator's fingers from the heat, allowing him to work close to the red-hot rods without inconvenience. The air also blows or sucks the freed insulation away. The larger machines are provided with rods which allow for the simultaneous removal of the insulation from two wires. The duration of the operation can be regulated; we are informed that the necessary contact in the case of ordinary light cables is only from one to two seconds.

An Oval Bowl Fire

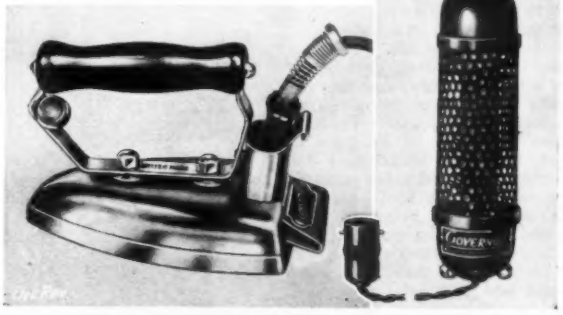
The aim of the ACE ELECTRIC CO., Spring Hall Lane, Halifax, in producing its new electric fire has been to convert the highest possible proportion of electrical energy into radiant heat. Actually the makers claim that 67-69 per cent. of the heat converted is radiant.

As is usual in this type of fire the reflector and the element are mounted on a swivel so that the angle of projection can be varied. There is also a guard in front of the element which partially safeguards against shocks and burns. The fire, which is oval in shape, is mounted on a heavy base to prevent overturning and presents a very attractive appearance.

It can be obtained with a loading of 600 or 1,000 W. The reflector measures 15 in. by 9½ in., while the base is 7 in. in diameter and the height 12 in. The cost is 39s. 6d., with a chromium-plated finish and complete with six feet of two-core flexible. Three-core flexible can be obtained for an extra shilling.

Some "Shaw" Domestic Appliances

MESSRS. JOHN SHAW & SONS, LTD., Wolverhampton, are supplying a number of new lines for the coming season. There are the "Governor Kenilworth" imitation coal fire, and the "Wenlock" 1-kW reflector fire. Plug-in elements are incorporated, and the prices are £2 4s. and £1 19s. 6d. respectively. Spare elements can be obtained at 5s. 6d. each. The "Junior" No. 6 2-kW fire, sold at £1, is also a new model with plug-in elements.



The "Governor" iron **A car radiator heater**

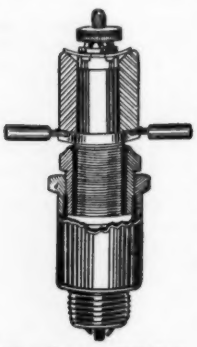
The "Governor" toaster, loaded at 550 W, is cheaper than the present model, costing only 12s. 6d. The top and base are of nickel-plated cast-iron. There is also an electric iron selling at 13s. 6d. It weighs 5½ lb., and has a loading of 450 W.

The "Governor" electric radiator heater can be used for warming petrol motor engines, etc.; it has a low loading—150 W—and is priced at 7s. 6d. A range of panel and tubular lighting fittings is also available, while a further new and interesting item is the "Trojan" hair dryer. This is priced at 33s., and a length of three-core flexible is provided without extra charge.

Three "Governor" fires:—The "Kenilworth," the "Wenlock" and the "Junior."

A Special Sparking Plug

Most users of internal combustion engines, whether for motor-cars, country-house lighting plant, or industrial purposes, are familiar with the reluctance of a cold engine to start easily. This is very often due to the condensation of moisture or "oiling" on the ignition plugs, and it can be overcome simply by the use of a new type of sparking plug made by the COOPER-STEWART ENGINEERING CO., LTD., 136, Long Acre, London, W.C.2.



The Cooper "E.H." plug

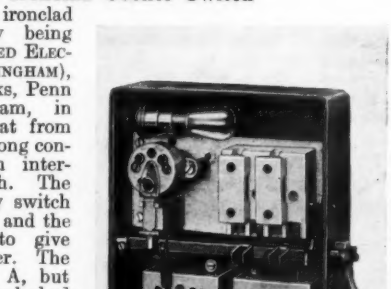
The accompanying part sectional view shows how a small heater coil is wound on the central electrode, oxide insulated wire being used to minimise the space occupied. A single wire connects all plugs to the battery, *via* a switch, connection being facilitated by a cup washer, which is surmounted by a porcelain sleeve with a clamping spring beneath the ignition terminal.

By switching on the heater for a few minutes before starting the engine the temperature of the plugs is raised sufficiently to evaporate all moisture which may have collected on them, thus enabling the engine to start with consistent ease and take up its load quickly and smoothly.

After running for a short while the heater coil is switched off. Its use prevents the heavy drain on the battery that accompanies the use of a "strangler," when the electric starter has to turn the engine fast enough for the incoming excess petrol to be ignited by the plugs.

An Ironclad Cooker Switch

The "Coolex" ironclad cooker unit now being made by the UNITED ELECTRICAL CO. (BIRMINGHAM), LTD., Coolex Works, Penn Street, Birmingham, in four types rated at from 30 to 50 A, is of strong construction with an interlocked d.p. switch. The 15-A d.p. auxiliary switch is a novel feature, and the plug is designed to give security to the user. The fuse units are 15 A, but the three-pin interlocked British Standard plugs can be either 5 or 15 A, an adjustable plate being provided for this purpose. The box is lined with silicate enamel and the outside finish is grey, stove-enamelled. There are separate interlocked covers for the main and auxiliary switches, and a separate fuse for the plug and pilot lamp. The prices of the models, one of which is illustrated, range from 30s. to 45s.



The "Coolex" cooker unit

A High-mounting Lighting Unit

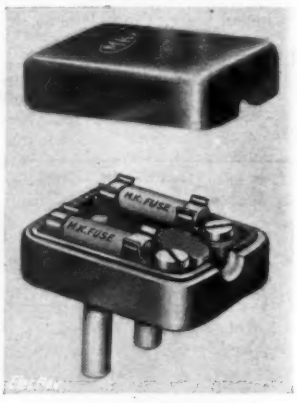
Those interested in factory power station and large building lighting generally will be interested in the "Credalux" high-mounting reflector recently introduced by the CREDENDA CONDUITS CO., LTD., Oldbury, near Birmingham. The heavy-gauge chromium-copper reflector is suspended by substantial rust-proof spring claws locked by a movable ring. By raising the locking ring the reflector can be instantly detached for maintenance purposes without removing the lamp.

The H.O. pattern lampholder is mounted on a central tube which can be fixed in any position to suit the size of the lamp and the width of the beam required. The reflector has a hammered finish which eliminates striations, &c., of filament. It has been found that 95 ft. above floor level is not the limit to the height at which this reflector can be suspended. Very high efficiency is obtained by confining the light rays within a definite adjustable angle. There are two sizes, both 16 in. diameter and 18 in. high, one at 35s. 6d. for a 200-W lamp, and with an E.S. lampholder, and the other at 36s. 6d. for a 300/750-W lamp with a G.E.S. lampholder.

A Small Fuse-plug

We have received a sample of the new fuse-plug now being manufactured by M.K. ELECTRIC, LTD., Wakefield Street, Edmonton, N.18. It is fitted with 5-A fuses and has been designed to provide protection for appliances when connected to the supply through two-pin lighting sockets. The plug pins are British Standard gauge, but the plug is of unusual shape and thus cannot be confused with the ordinary non-fused plug. Double-pole fuses of the cartridge type are embodied in it. Double metal caps are fitted at each end of the cartridge, so that when a fuse blows the outer caps are released. The fuses are small and have been tested by the National Physical Laboratory; they are supplied in three sizes —5 A, 2 A and 1 A.

This type of fuse-plug is specially suited for use with mains radio or clock circuits. The price of the plug with fuses is 2s., and the size is $1\frac{7}{8}$ in. by $1\frac{1}{4}$ in.



The M.K. fuse-plug

A Labour-saving Wrench

Wiremen, &c., should find the "Olbo" wrench recently introduced by the UNION GLUE & GELATINE CO., LTD., Cransley Works, Garrett Street, Golden Lane, E.C.1, useful and time-saving. Although primarily a wrench for pipe work it also serves for general purposes. The main feature is that it can be used satisfactorily in very restricted spaces, owing to the special shape of the head and the position of its end grip in relation to the leverage. Immediate setting, easy adjustment, instantaneous and powerful pressure by the end grip, and non-slipping and rapid operation on the ratchet principle, are outstanding features. It is available in sizes from 7 in. to 9 in. long at prices from 7s. to 42s.

Projector Resistances for Home Cinemas

The CRESSALL MANUFACTURING CO., Eclipse Works, 31-32, Tower Street, Birmingham, announces the introduction of a range of portable resistances specially designed to enable home cinema projectors to be used on any standard supply voltage. They will also operate any motor-driven appliances, heaters, scientific apparatus, &c., wound for the same voltage as the projector and with the same amperage.

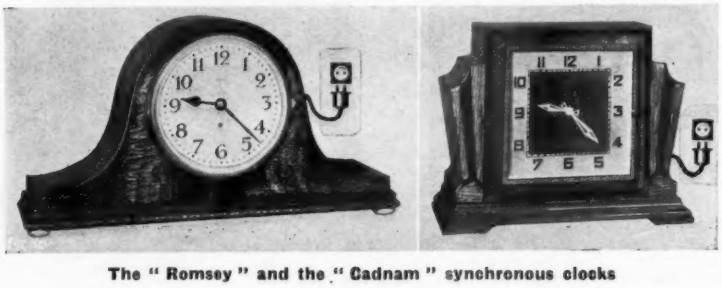
The projector resistance is very simple to connect up and operate. Special "sunk-flush" all-insulated sockets are used, so that it is only necessary to insert the plug connecting to the electricity supply in the socket at one end of the resistance. The slider knob is then moved along until it indicates on the calibration plate the voltage of the supply, and the current is switched on. The equipment is very light, compact and portable.

Portable Cressall home projector resistance

The specification provides for a ventilated steel case on a substantial base with rubber feet, complete with a carrying strap. High-grade oxidised resistance wire is wound on "Sindanyo" formers. Connection between the slider rod and the formers is by a laminated phosphor-bronze contact brush arranged with adequate freedom of movement. The standard finish is electrolytic Florentine bronze, and there are nine sizes varying from 300 W to 1,500 W at from 24s. to 60s. each.

Synchronous Striking Clock

Synchronous electric clocks are not a novelty, but MESSRS. EVERETT, EDGCUMBE & CO., LTD., 117, Victoria Street, S.W.1, claim to be the first British firm to make a model which strikes the hours. These clocks embody the self-starting "Synclock" motor which is not stopped by a momentary interruption of the supply. After a prolonged break in the supply which affects time-keeping a red disc shows on the dial, indicating that the clock may be slow. The cost of the striking clock is only 14s. 6d. more than the silent models, the prices of which range from 3 guineas for the "Romsey" to £5 3s. for the "Cadnam"; both of these models are illustrated.

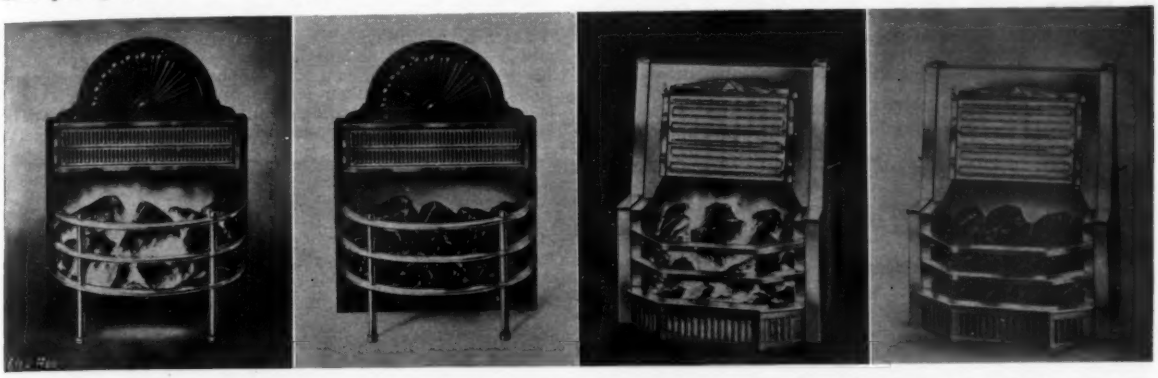


The "Romsey" and the "Cadnam" synchronous clocks

"Magicoal Plus"

In our issue of September 2nd (p. 338) we announced the early advent of the "Magicoal Plus" fire, which is an old friend in a new and better guise. We are now able to reproduce photographs of the "Rayberry" and "Starberry" models of the new type which indicate their pleasing appearance with and without the glow and flicker. What specifically differentiates the "Magicoal Plus" range from the "Magicoal" (without the affix) is the construction of the "coal." This is now made of hollow metal instead of moulded slabs of crude glass and is in bigger lumps representing the best "Silkstone." The effect is to give a remarkably close semblance to reality that surpasses that of even the previous fires of Messrs. BERRY'S ELECTRIC, LTD., 85 and 86, Newman Street, W.1. It impresses one as a lump or lumps of coal which are gradually burning themselves into a more completely live condition instead or remaining in a settled black unconsumed state. The "Magicoal Plus" is exciting a good deal of interest up and down the country, and we are informed that some large orders have been booked.

The "Rayberry," which has a loading of 3 kW, sells at £7 7s., while the "Starberry"—a 2-kW model—costs £3 12s. 6d. (2s. extra for trivet).



The "Starberry" and "Rayberry" fires illustrating their appearance with the "coal" illuminated and "dead."

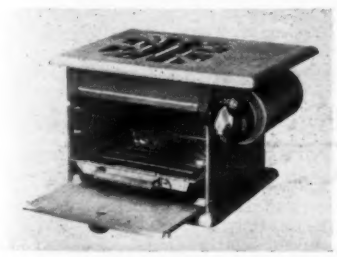
Small Battery Lamps

A comprehensive range of "Drydex" torches, flash lamps, cycle lamps, &c., is announced by the CHLORIDE ELECTRICAL STORAGE CO., LTD., Clifton Junction, near Manchester. The torches are of two types—"Standard" and "Bijou"—the former being round or octagonal and of the "fixed-focus spot light" type. They are available in nickel or cellulose at from 6s. to 7s. 6d., according to type.

The "Bijou" torches are finished in nickel-plating, leather and leatherette at from 1s. to 1s. 6d., and a pen-type torch, in nickel, with the clip forming the switch, costs 2s. 6d. Four flash lamps with from 1 in. to 1¼ in. diameter bull's eyes cost from 1s. 6d. to 2s. 3d. each, and a spot light model with a 1¼ in. silvered reflector costs 3s. 6d. A 2¼ in. reflector and a 3 in. reflector cycle lamps, each black with nickel fittings, are listed at 2s. 6d. and 4s., respectively. The smaller of these is fitted with a spring bracket screw switch and a 2¼-in. reflector, and the larger one has a 3-in. silvered reflector, hinged front and a spring lock switch.

A Compact Breakfast Cooker

MESSRS. WALKER, HUNTER & CO., LTD., Portdownie Iron Works, Falkirk, are responsible for the introduction of a compact and efficient breakfast cooker, the "Simplex," designed for quick service. It boils and grills (or toasts) simultaneously being fitted with an open-coil element guard. The hob accommodates three small saucepans. There is a drip-tin and grid in the chamber, while an asbestos mat, when placed on top of the hob deflects the heat for grilling only, or when placed immediately under the element for boiling only.

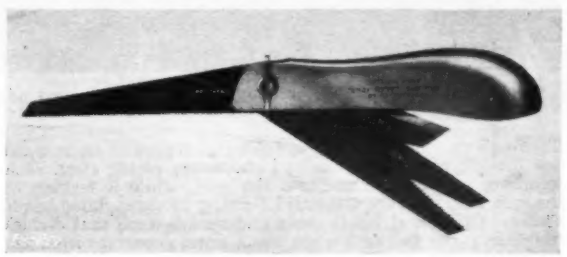


The "Simplex" breakfast cooker

It is available with loadings of 1,500 or 2,000 W and three-heat control, and the overall dimensions are 14 in. by 9 in. by 10 in. deep. There are three finishes: All aluminium painted, £1 17s. 6d.; stove black enamelled with grey vitreous enamelled top plate, £2 5s.; and all grey vitreous enamelled outside, with white enamelled inside, £3.

A Handy Pocket Tool

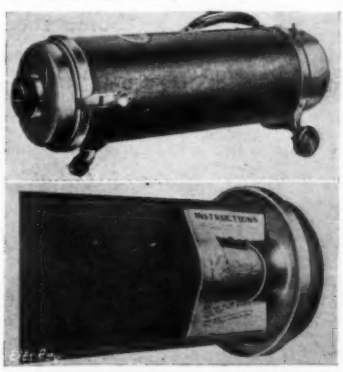
Pocket tools interest many in the electrical industry. A recent introduction is the No. 28 "Enox" pocket saw, a production of MESSRS. FRY'S (LONDON), LTD., 24-25, King Street, Royal Mint Street, E.1. It has a highly polished nickel-plated handle and is fitted with three saw blades and one short-bladed knife. Each saw blade is manufactured from high-quality steel suitably tempered for its particular work. It is 4 in. long and sufficiently stiff for all metal and fibre cutting. The knife should prove useful to jointers and maintenance men for lead and belt cutting. Special blades for slotting can be supplied. There are no loose parts. When closed the handle completely houses the saw blades. The tool is neat and compact, measuring about 5¼ in. by 1¼ in. by ⅜ in. The price of this handy outfit is 3s., and extra blades cost 3d. each.



The "Enox" pocket saw

Special Vacuum Cleaners

We learn that the standard "Siroma" vacuum cleaner produced by MESSRS. ARTHUR MORRIS & CO., 46, Commercial Street, E.1, is to have a big brother, the "Siroma Super." The outstanding feature of the new model is that it incorporates a removable paper bag. Otherwise it is similar as regards the construction, accessories, and the motor. The cleaner is supplied complete with a dozen spare bags at £7 7s., and the bags cost 1s. 6d. per dozen.



Above: The "Siroma Super"
Below: Paper bag for the cleaner

The AUTO-MAID VACUUM CLEANER CO., 62, Blandford Street, W.1, has also supplemented its range of vacuum cleaners by the "Auto Maid Super Luxe." This all-British machine has the following outstanding features: powerful suction combined with silent running; ball bearing motor; easily removable and emptied internal dust bag; very strong braided hose; light and compact construction; detachable plug and switch, and combined wall plug and adaptor; and blowing attachment. Price £6 6s.

The "Auto Maid Super Luxe"

A Notable Cinema Installation

Straight lines and angles give place to curves

WOLVERHAMPTON'S latest cinema, the Gaumont Palace, has a seating capacity for 2,000, and has electric lighting fittings which are all of circular or cylindrical form instead of the customary straight line designs. Neon lighting outlines the principal architectural features of the building, on which are three massive neon signs with the name of the cinema, and several interchangeable programme signs.

The entrance hall is lighted by a fitting 18-ft. long, housing twenty lamps; this is the first of its type to be used in cinema illumination. Three enormous futuristic fittings of an unusual box design, with opal glass and chromium plated steel, each weighing two cwt., illuminate the café, while a feature of the café lounge is the concealed lighting in three fluted silver niches. Cylindrical lights slung underneath a rib that divides the ceiling into two arches are also a novel departure from the orthodox in the lounge.

The main ceiling is illuminated by 300 40-W lamps and a flat dome is illuminated by lamps, concealed in a cornice, with flame coloured bulbs. Scroll fittings illuminate the front of the balcony. The proscenium is floodlighted by twelve 200-W concealed daylight-blue lamps, an innovation in cinema lighting. The silver fluted hood of the proscenium is illuminated by seventy 40-W gasfilled lamps concealed in a trough.

The fittings throughout were supplied by Messrs. Troughton and Young, Ltd., and altogether 3,000 lamps aggregating 120 kW are used. Electricity supplied by the Wolverhampton Corporation is taken into high-voltage transformers and stepped down by Hackbridge transformers to 400/230 V. The d.c. supply for the film projectors is obtained from two 25-kW G.E.C. motor-generators and feeds the latest type of Connolly high-intensity arc, supplied by Messrs. J. Frank Brockliss, Ltd. Emergency lighting is supplied by a battery automatically connected to the main lighting should a failure of the electricity supply occur.

The Gaumont Palace, Wolverhampton: Left: Opal glass and chromium-plated fittings in the café lounge. Centre: The main ceiling and proscenium illumination. Right: One of the café box-type fittings, weighing two cwt.

The theatre is designed for either films or stage plays. The whole of the electrical installation was carried out by the Gaumont British Corporation, in accordance with specifications prepared by Mr. S. Hart, A.M.I.E.E., the chief engineer, and under the immediate supervision of Mr. W. E. Cucksey (divisional supervising engineer).

Modern Church Lighting

Some recent installations

CHURCHES, both as regards new buildings and conversion schemes, appear to be making a big call on the services of the lighting engineer; indeed one large company manufacturing lighting equipment informs us that it is dealing with two church-lighting schemes per week. A few of the jobs recently completed are described in the following notes. Some pictures appear on page 383.

One of the main features of the reconstruction scheme of the Highbury Quadrant Congregational Church is the specially-designed lighting. The main hall, choir, and galleries are lighted by Holophane reflector-refractors, while the exterior floodlighting enhances the beauty of the architectural design.

Four-light cluster fittings are suspended from the main beams in the church body, and in various positions over and under the galleries single pendant units are installed. In the choir stalls concealed lighting is provided by "F.880" units, while "FL.500 E" fittings serve for the exterior lighting. Dr. H. Ingham, the minister, says: "The church appears to be flooded with sunlight, and the effect everywhere is all that could be desired." It is interesting to note that this church, which seats 2,000 persons, is one from which B.B.C. services are broadcast. The electrical contractors responsible for the installation were Messrs. Twentyman & Willmott, Ltd.

The two churches referred to in a recent article on tubular heating afford excellent examples of lighting. Lea Road Congregational Church, Wolverhampton, is illuminated on the partially concealed floodlighting principle. In the angles formed by the roof trusses and the walls, on the east side, 200-W Benjamin reflector fittings are mounted, ten all told, while the gallery, aisles, vestibule, and cloak-room are equipped with "Bencolite" enclosed units. In the chancel there are two 150-W angle reflectors. A special spot light, similarly placed to the reflector fittings, serves the pulpit.

The main lighting is controlled by a dimmer, so that during the sermon the lights can be lowered with very fine effect. The stained-glass window over the chancel can be illuminated externally by a 250-W projector floodlight mounted on the roof of an adjoining schoolroom.

The new Wesleyan Church at Stechford, Birmingham, is of exceptional interest, as in many ways it departs from the orthodox type of architecture.

The novel lighting features are a large lavlight in the centre of the ceiling and a smaller one to match over the gallery, whilst round the walls are twenty half-lantern type brackets of a special design, arranged to diffuse a softly tinted light throughout the building. A chromium-plated reflector, with a focused high-power lamp, is concealed in the top of each bracket, effectively floodlighting the upper portion of the church. The result is extremely pleasing, and not only adds to the dignity of the church, but assists in providing brighter and more attractive surroundings for the worshippers. The whole of the fittings were manufactured at the Birmingham factory of Messrs. Falk, Stadelmann & Co., Ltd.

The nave of St. Peter's Church, Arkley, Barnet, is equipped with eight "Benjamin" 150-W elliptical angle reflectors, and four of these fittings have been installed in the chancel. The Lady Chapel is illuminated by four 100-W units of similar type. The installation was carried out by the North Metropolitan Electric Power Supply Co.

"Benjamin" fittings have also been employed in the small St. Raphael's Church attached to the Home for Epileptics at Barvin Park, Northam, Middlesex.

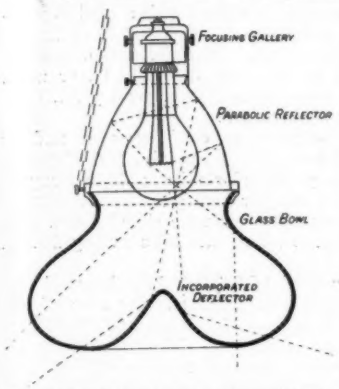
The Lady Chapel of Hereford Cathedral, which is among the churches illustrated, is provided with adequate and even illumination by means of Ediswan "Mirolux" trough fittings equipped with diffusing front glasses. St. Anne's Church, Derby, is another good example of the use of Ediswan projector fittings.

The Institution of Engineers and Shipbuilders

The 1932-33 session of the Institution of Engineers and Shipbuilders in Scotland opens on October 11th, when Mr. A. Gilchrist will deliver his presidential address. Among the papers to be read during the session are the following:—December 6th: "Recent Developments in Diesel Engines," by Mr. R. Sulzer. December 20th: "Engineering Research at the National Physical Laboratory," by Dr. H. J. Gough. The papers for the second half of the session will include: "Electric Arc Welding in Shipbuilding," by Mr. J. L. Adam; and "Hydro-Electric Developments in the Highlands of Scotland," by Messrs. A. S. Valentine, H. M. Gibb, and E. M. Bergstrom. The "James Watt" dinner will be held at the Grosvenor Restaurant, Glasgow, on October 14th. In view of their success last season, the informal luncheons will be resumed in November.

A Novel Illuminating System. By C. P. Jenkyns

EXPERIMENTS which have been in progress since last winter have resulted in the production of a series of designs and specifications for new lamp fittings which will shortly make their appearance on the British market. The optical principles are the production of a luminous flux within an opaque reflector and the dispersion of the resultant beam by means of deflecting media which vary in constitution according to the requirements of the individual model.



The pendant form of the illuminator

In its simplest form the fitting consists of a metallic or glass parabolic upper reflector in which is housed a clear gasfilled lamp so mounted on a focusing gallery that a downward beam of light is produced. Beneath this is suspended a glass bowl in the centre of which is a conical projection, the function of which is to disperse the major portion of the vertical beam in a lateral direction as illustrated.

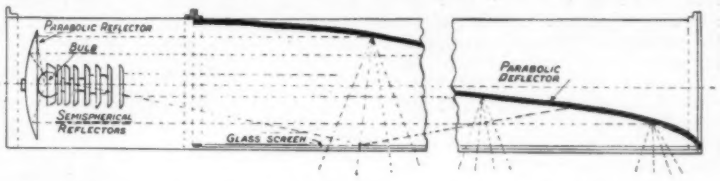
Improved Distribution

The result achieved is a reduction of the intense illumination directly beneath the unit and an increased dispersion laterally, so producing a fairly flat illumination curve which enables some points to be dispensed with and facilitates the lighting of low roofs. There is neither a dark nor a bright patch above the unit, the intensity being just sufficient to light the roof uniformly without wasting energy.

A variant made in a green-blue tint produces light of so good a colour-matching quality that for non-technical purposes it may be regarded as daylight. Another form of illuminator has been designed for architectural illumination. In this case a projector lamp is housed in a box and a short-focus parabolic mirror is used to project a parallel beam in the desired direction. In front of the lamp a series of hemispherical mirrors intercept the radial radiations forward, and by reflection add them to the parallel beam, at the same time screening them from the observer.

The parallel beam is intercepted by a deflector of opaque matt but highly reflective material arranged on a parabolic curve with axis parallel to that of the beam. A glass panel in front, through which the deflected light is distributed, also acts as a compensator, reflecting direct light which reaches it within the critical angle back on to the deflector. A mirror on the base (in the case of a cornice light) also performs the same function, but on top or wherever it can be seen by the eye it is necessary to employ a white surface; otherwise the familiar " dark " effect of a mirror is produced, which is undesirable.

This arrangement can be used effectively for the artificial illumination of panels, columns, laylights, false windows, and all other architectural forms of ornamental lighting. It is claimed that the system makes possible architectural lighting at a greatly reduced cost and does away with the heat nuisance inseparable from the multiple lamp system. The efficiency is very high, but against that must be set the short life of projector bulbs, ordinary bulbs being useless owing to their low optical efficiency when used with mirrors.

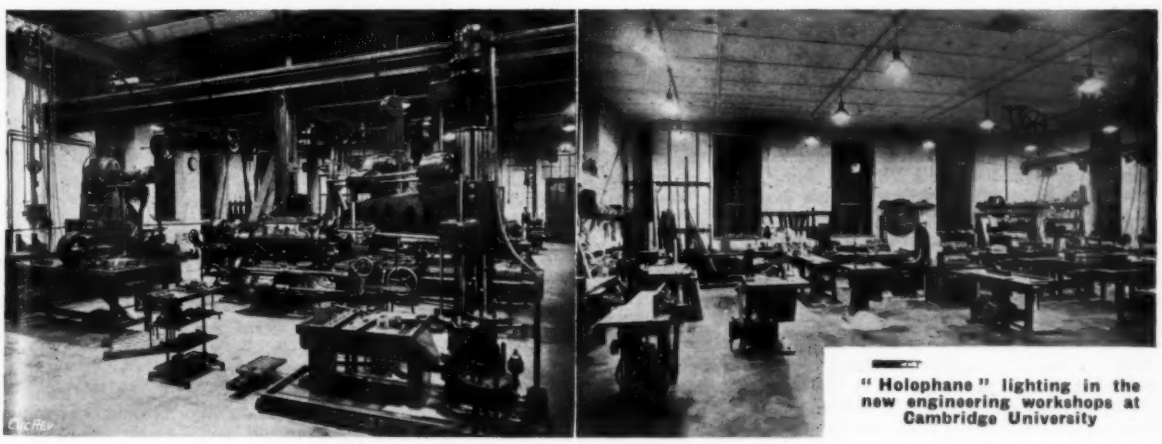


Diagonal radiation compensated for by reflection of the clear front screen and parabolic deflector

Panel or cornice illuminator

University Workshop Lighting

A SPECIAL feature is made of engineering training at Cambridge University. The new engineering laboratory and woodworking department which are depicted in the accompanying illustrations have been constructed on modern lines so as to familiarise undergraduates with the latest practice. In consonance with the general scheme, the University authorities decided that the lighting installation must also be in conformity with the best modern ideas on the subject.



" Holophane " lighting in the new engineering workshops at Cambridge University

The wiring for, and the installation of, the lighting equipment were carried out by the Cambridge Electric Supply Co., Ltd., and " Holophane " industrial-type reflectors with glass covers, which are suitable for exposed positions, have been employed. The fittings are of the A. 3093/200-W and A. 3092/150-W patterns, the former being 12 in. in height and diameter and the latter of a similar height but somewhat smaller in diameter.

Throughout the engineering laboratory the 200-W units have been suspended 9 ft. apart, centre spacing, and mounted at a height of 11 ft. They provide an illumination intensity of 18 foot-candles. The same sizes of fittings and lamps are employed for lighting the woodworking shop, except that the centre spacing is increased in this case to 10 ft. and the mounting height to 12 ft. An intensity of 15 foot-candles is attained.

General lighting in the adjacent instrument shop is provided on similar lines; that is, by means of A. 3093/200-W units. But in addition over a bench by a window a system of localised general illumination has been introduced, for which purpose the A. 3092 type units, each containing a 150-W lamp, are employed, to provide an intensity of 20 foot-candles at that position.

By these means shadows have been reduced to the minimum, and adequate, well-distributed illumination has been obtained throughout the various departments, as will be seen from the examples illustrated.

Municipal Transport and the Salter Report

Speaking last week at the annual conference of the Managers' Section of the Municipal Tramways and Transport Association Mr. C. Furness (Blackpool) said that it was hoped that some of the recommendations of the Salter Report would not be adopted without modification. If they were the resultant increase in costs would make it impossible for a number of municipal transport undertakings to carry on.

Electricity Supply Progress

Domestic supply again compensates for the industrial decline

LAST week we announced the publication of a new volume of the Return of Engineering & Financial Statistics relating to electricity supply. This Return covers the twelve months ended March 31st, 1931, for public authority undertakings and December 31st, 1930, for the companies. In its 626 pages are included particulars, for each undertaking in Great Britain, of systems of supply, plant installed, output, sales to different classes of consumers, kWh per head, number of consumers, capital expenditure (allocated to different sections), revenue, and working costs. These details are co-ordinated in clearly expressed notes and summarised tables.

Those whose duties require them to go closely into details will find the volume well worth fifteen shillings. Many others of our readers will wish to have no more than such particulars as will present a broad survey of the supply section of our industry. We give below some of the leading facts from the Return; we deal with their chief implications in our leading article. Where a comparison with the previous year is important, we give the earlier figures in parentheses.

Consumption and Revenue

The number of statutory authorities was 666; these include the Central Electricity Board, three Joint Electricity Authorities, five local authority joint boards, 379 local authorities, and 278 companies. Public authorities supplied two-thirds of the output, and companies one-third, the same proportion holding good for generating capacity and capital expenditure.

To obtain the complete measure of electricity used account must be taken of the output of independent traction stations, industrial works, and non-statutory undertakings, but the Return does not include these; nor does it deal generally with the operations of the Central Board.

Supplies were given by statutory undertakings to 4,015,000 consumers (3,472,000). These had an average connected load of 288 W, a maximum demand of 105 W, and a consumption of 203 kWh per annum. Motive power is still by far the largest outlet for electricity and accounted for 59.2 per cent. of the 9,073.7 million kWh sold and 34.7 per cent. of the revenue. Industrial conditions are reflected in a decrease of 37 million kWh from the previous year's consumption (the first set-back since 1921-22, when there was a prolonged coal dispute), but this was more than counterbalanced by the 400 million additional kWh sold for lighting and domestic purposes, which was easily the second largest group, providing 30.2 per cent. of the sales and 58 per cent. of the revenue. Traction 8.8 per cent. and public lighting 1.8 per cent. accounted for the remainder.

The average revenue per kWh sold was 1.38d.—the same as in the previous year, but in view of the reduction in low-priced power units it is a better result than might be at first apparent. The increased lighting and domestic business brought about a lower average price of 2.67d. (2.86d.) per kWh; that its load factor was good is indicated by the constancy of the load factor of generation, at 33 per cent.

The number of undertakings receiving less than 3d. per kWh as an average for this class of consumer is growing. Some receive more than 10d. per kWh for lighting; it is conceivable that this may be justifiable in extreme cases, but what are we to think of the optimism of undertakings that expect to build up a power load at over 6d. per kWh?

The total revenue was £63.5 million (£59.7 million). Expressed as a percentage of capital expenditure, the revenue was £17.9 per £100, or £15.9 exclusive of intersales.

Generation and Bulk Supplies

Supplies to these consumers entailed the operation of 483 generating stations of from 9 kW to 257,000 kW (Barking), containing 6,945,800 (6,600,000) kW of plant. All but 4 per cent. of the plant was a.c. at 11 different frequencies; 82.2 per cent. was at the standard 50 cycles per sec., and most of the remainder at 40 or 25 cycles. In 186 stations a.c. only was generated; in ninety-eight both a.c. and d.c.; and in 199 d.c. only. More than three-quarters of the plant was in ninety-four stations of 25,000-kW capacity or over.

As the aggregate of the maximum demands on the stations was only 3,801,342 kW, the spare capacity was about 83 per cent. Some of the surplus we suspect to be due to the reluctance of local authorities to write off the value of plant before the expiry of the sinking fund period, but the margin should be reduced to 15 or 20 per cent. under the operation of the grid.

The kWh generated was 10,947 (10,401) million, of which 6 per cent. was used in the works and 12.7 lost in distribution, etc. Steam turbines generated 96.05 per cent.; oil and gas 0.87; water, 2.92; waste heat, etc., 0.16 per cent. The increase in water power from 136 million to 320 million kWh was notable. The proportion of the installed capacity of each class of prime mover corresponded fairly closely to the output. Some 57 per cent. of the steam turbines were of 10,000 kW and over.

There were 2,431 boilers in commission with a total evaporative capacity (from and at 212 deg. F.) of about 79 million lb. per hr., of which 46.5 per cent. had individual outputs of 50,000 lb. or more, and 75 per cent. of 30,000 lb. or more. Steam pressures ranged from 100 to 475 lb. per sq. in., apart from the 1,100-lb. boiler at Bradford.

Intersales of energy between undertakings accounted for 25.8 per cent. (22.5) of the total public supply. Local generation only was relied upon by 223 undertakings; 176 took supplementary bulk supplies, the rest purchasing their entire output. During the year twenty-nine stations were closed down. The revenue from bulk supplies, including intersales, averaged 0.58d. per kWh.

Coal consumption amounted to 8,681 (8,881) thousand tons at an average price of 15s. 11d. (15s. 5d.) per ton; of this amount 941,000 tons were pulverised and used in 19 stations. Oil engines took 26.4 tons of fuel oil. These figures are of historic importance only, as the fuel returns for 1931 are already available (ELECTRICAL REVIEW, June 10th, p. 861). Supplies were given to the distribution networks at 13 frequencies (two more than reported for generation, owing to the non-standard frequencies of two bulk supplies from non-statutory sources). In 26 undertakings distribution was at two or more frequencies; a.c. only was available on 253 systems, a.c. or d.c. on 288, and d.c. only on 121. Declared voltages (including related voltages on three-phase and three-wire systems) numbered 45 and ranged from 100 to 480 V

Working Expenses

Working expenses per kWh sold averaged 0.742d. (0.751d.); for public authorities the figure was 0.813d., and for companies 0.655d. In total amount they came to about £37 million (£34.6 million), or £10.4 per £100 of capital expenditure. Generation absorbed 31.13 (33.34) per cent. of working expenses, of which 19.11 went on fuel, 6.18 on salaries and wages, 5.05 on repairs and maintenance, and 0.79 per cent. on oil, water and stores. Energy purchased, including intersales, was 19.87 per cent. The remaining percentage proportions were: distribution, 13.10; management, 13.56; rents and taxes, 4.57; local rates, 11.31; miscellaneous, 6.46. Local rates required £4.18 million, representing 1.18 per cent. on the capital expenditure and 6.59 per cent. on the revenue.

An increase of 3,200 in the number of staff and workmen brought the total for electricity supply up to 64,857, to whom £10,421,077 was paid in salaries and wages (revenue account). Nine persons were employed for every 1,000 kW of generating plant. Of the total employés, 29 per cent. were engaged on generation, 54 per cent. on distribution, and 17 per cent. on administration.

The cost of generation (excluding capital charges) was reduced from 0.27d. to 0.26d. per kWh, in spite of a small rise in the cost of coal. For public authorities the average was 0.277d. and for companies 0.234d. per kWh.

Capital and Surplus

The total expenditure charged to capital account amounted to over £354 million, £216.5 million by public authorities and £137.6 million by companies. The average expenditure for all purposes per kW of generating plant installed was £51, of which 38 per cent. was for generation and 62 per cent. for transmission, distribution, &c. The net capital expenditure during the year was £27 million, equivalent to 8 per cent. of the total. The excess of revenue over working expenses was 7.5 (7.7) per cent. of the capital expenditure at the end of 1930-31. The gross surplus (including other income) was £28.7 million, or 8.1 (8.4) per cent. of the capital expenditure.

Of the £16.4 million gross surplus made by public authorities, 38.2 per cent. was paid in interest and 40.6 per cent. in loan repayments and sinking funds; the balance was applied to reserve and renewals 8.65, capital expenditure 9.27, relief of rates 1.59, and net increase in balances on net revenue account 1.69 per cent. Local rates were subsidised by 75 undertakings to the extent of £297,000, while 19 others received £37,000 from the rates. In 1929-30 108 undertakings paid over £487,000, so there was a distinct decline in this reprehensible practice.

Companies paid away 19.07 per cent. of their gross surplus of £12.3 million as interest, 40.33 per cent. in preference and ordinary dividends, 36 per cent. to depreciation and reserve, 1.41 per cent. as net increases in balances on net revenue account, and 3.19 per cent. to appropriation accounts common to combined undertakings. The average rates of dividend were: Preference, 5.79 (5.87) per cent.; ordinary 6.85 (7.02) per cent.

"I Beg to Reply . . . ." By Applicant

Employers advertising for men also have their shortcomings*

PERIODICALLY one finds in the technical journals an article written by a harassed employer protesting against the stupidity of applicants when answering advertisements. Instances are given of their gross carelessness, their lack of method, and their inability to grasp the simple essentials of the carefully worded advertisement. Very valuable and common-sense hints are interleaved to guide the witless applicant on the way to lay out his application in a form that will save, quite rightly, the time of the prospective employer. Even so, the employer still finds himself deluged with "impossible" replies, sometimes written on brightly hued paper, and, what appears to annoy him more, lacking some of the essential information which has been so clearly specified in the advertisement.

This state of affairs is not, however, altogether due to mere stupidity or rank carelessness on the part of the applicant. It is very often the result of a lack of imagination on the part of the employer in wording his advertisement, or in understanding the motive underlying the unsystematic effusion that he receives, or again, the careful omission of information which the applicant does not wish to disclose at that stage.

Many men apply for posts which are outside their previous experience, for such commendable reasons as an earnest desire to get away from their present job, because it may be either uncongenial, overcrowded, or lacking in opportunity; and an equally earnest desire to gain further experience, the more particularly if it is in a line that appears more suitable and to offer greater scope.

The radio equipment employed by the New York police force (see page 410)

Who can blame them if they have "a shot at the job," even if they feel in their hearts that their chance of achieving the desired result is as far from fulfilment as their chance of winning a first prize in an Irish sweepstake? If they don't try and make a personal effort, no one else is going to drag them out of oblivion into a more promising position. After all, the effort only entails a little careful thought and a 1½d. stamp, whereas the sweepstake necessitates the parting with a hard-earned ten bob, which might take them and their wives to the "talkies" several times, and thus brighten the monotony of their depressing existence.

Forlorn Hopes

Hence the large number of applicants who must carefully camouflage a lack of requisite experience, avoid sending testimonials that are gratuitous proof of their unsuitability, and exhibit a very natural shyness to price a position of which they have had little or no previous experience. To bolster up these applications the writers employ the derided phrases, "a hard and conscientious worker," "a live wire," "wide experience of electrical engineering in all its branches," and express the pathetic hope that "the application will be given full consideration," which is nothing more or less than an appeal to the employer to read between the lines and visualise the cry for help and opportunity from one who feels the urge to "get on" and cannot find a suitable outlet.

Admittedly these applications are a waste of time to the individual who is compelled to wade through some hundreds or more replies, but they are inevitable, and may well be the result of a loosely worded advertisement, giving the "outsider" a false hope, and even causing a more or less suitable man to misconstrue the main essentials of the post offered. Many advertisements fall far short of a clear and simple statement of the requirements, and it is not therefore altogether surprising if they call forth replies even from strange individuals with a coloured paper complex.

For those whose training and experience justly entitle them to forward an application there are many pitfalls. The capable and methodical man will naturally lay out in scheduled form the particulars of his education, training and experience; but to state facts relating to experience fully, clearly, simply and concisely is an art in itself, and needs some practice. The most suitable man may not have drawn up an application for many years, and it may suffer very materially in consequence. The "job hopper," if he isn't too blatant a type, may get away with it, though his real abilities are very much inferior.

"State Salary Required"

However, the most difficult and, in the applicant's opinion, the most unfair answer he has to make is that relating to the salary required. Employers may consider that an applicant should know his own market value. What man really does? His market value is the highest salary he can obtain and all of us want a bigger salary than that which we are getting. But how are we to know what is in the advertiser's mind when his name and even the district in which the post is offered are completely hidden under a box number? Market values vary all over the country. They are dependent upon so many extraneous conditions, such as the exact scope and responsibility of the job, suitability and cost of housing and living in the district, possibilities of advancement, security of tenure, and many other considerations.

What is he to do? If he specifies a salary that he deems a sufficient recompense for what he imagines are the duties involved—the uprooting of his home, the sacrifice of friends and associations, and the uncertainty of the new position—he feels that the advertiser may have very different views and summarily dispose of his carefully prepared application. Again, he fears that the less experienced man or the "job hopper" may undercut him. On the other hand to specify a minimum figure leaves him without that greatest of all incentives, the thrilling satisfaction of having a little more money both to save and to purchase those extra comforts for self and family that we all desire. Of course, if he is already in a fairly secure and comfortable job he will stipulate the highest figure he believes he can get, or omit one altogether and let it go at that.

But what of the man who feels his present job rocking under his feet through circumstances which he may or may not have been able to control? Is he to cheapen his price to the lowest figure and add to his already growing anxiety by the uncertainty of what the change involves? Or is he to stipulate a figure that afterwards may cause him to regret that he did not offer himself at an unremunerative price rather than face the desolation of unemployment?

The Doubtful Value of Testimonials

There are often many sound reasons why an employer should hide his identity under a box number, but, I submit, there are none if he uses a box number merely to avoid stating clearly what he is prepared to pay for the services of the chosen candidate. He alone knows all the circumstances and conditions attached to the post, and should he be afraid the salary will not attract the best man, then he should reconsider this figure or mention it as a minimum. What does he gain by this omission? Nothing beyond the unexpressed invective of the applicant; leaving a feeling that he will be squeezed both now and in the future. Supply authorities do not hesitate to give particulars of the salary offered, and the published short lists show that they obtain applications from very able men for vacant positions.

Finally, there is the irksome necessity to supply copies of "three recent testimonials." What help are they? Is it not far wiser to ask for references from those applicants who have been selected for an interview? A confidential letter to the man's employer in the post or posts previously held will elicit far more satisfactory information regarding the candidate than the obsolete testimonial.

* See "I Beg to Apply . . ." By An Employer, ELEC. REV., Sept. 2nd, p. 328.

Swedish Industry and Trade

IT was not until the autumn of 1930 that the effects of the general economic depression were felt in Sweden to any marked degree, states Mr. W. J. Glenny, H.M. Commercial Counsellor at Stockholm, in a Department of Overseas Trade report on the economic conditions in that country (H.M. Stationery Office, 2s.).

During 1931 adverse conditions became intensified and the export industries were particularly affected. While early in 1931 purchasing power seemed unaffected, unemployment was increasing, and by the close of the year retail sales began to decline and failures became more numerous. At the end of September Sweden decided to abandon the gold standard, and this brought a temporary relief to certain industries.

The country has at present several problems to face. Production costs in the export industries are large, particularly labour charges, the standard of living of the Swedish worker being high. The solution of these difficulties may well result in decreased consumption of imported goods. It is not, however, anticipated that the demand for high-grade United Kingdom imports will show a marked decrease, especially in view of the present currency conditions.

Sweden's financial position at the moment is dominated by the failure of Kreuger and Toll, and the difficulties of the Match Company and the Skandinaviska Bank. But, although these factors are responsible for uncertainty and weakness in many quarters, there is no reason to fear that the natural resources of the country and the soundness of its State finances will not prove more than equal to the strain.

Arrangements made in the summer of 1931 for an association of interests between L.M. Ericsson and the International Telephone & Telegraph Corporation of the United States have considerably strengthened the position of the telegraph and telephone manufacturing industry. In the autumn of 1930, Messrs. Kreuger & Toll had acquired a controlling interest in the Ericsson company and in 1931 an exchange of holdings between the latter concern and the American Corporation was arranged. The agreement between the two companies provides for the exchange of patent rights and co-operation in competition for new telephone concessions. Owing, however, to the collapse of Kreuger & Toll the present position is very obscure.

We reproduce below some particulars of Sweden's foreign electrical trade during 1931. In the case of imports, Germany was the principal supplier in every instance; Great Britain's share is given where possible. As regards exports, the principal buyer is shown in parenthesis, and Great Britain's purchases are also stated. The pound sterling is equivalent to about 18 kronor :—

IMPORTS.	Kron. thous.	Inc. or dec.
Batteries, accumulators and parts—		
Total	4,977	+ 559
Great Britain	244	— 7
Radio apparatus—		
Total	12,910	+ 2,004
Great Britain	750	— 220
Motors and generators—		
Total	3,170	— 470
Great Britain	144	— 51
Transformers—		
Total	690	— 220
Great Britain	30	— 123
Stators, rotors, current collectors, etc.—		
Total	370	— 90
Metal filament lamps—		
Total	1,770	— 1,560
Carbon for electrical purposes—		
Total	1,314	— 371
Great Britain (brushes)	130	— 20
Regulator and control apparatus—		
Total	430	— 132
Switches, etc.—		
Total	2,970	— 160
Electricity meters—		
Total	1,370	— 20
Other electrical measuring instruments—		
Total	720	— 90
Insulated cables and wires—		
Total	2,490	— 2,706
Special apparatus—		
Total	7,620	+ 515
Great Britain	2,280	+ 20
Rontgen-ray apparatus—		
Total	370	—
Vacuum cleaners—		
Total	510	+ 20
Insulating tubes—		
Total	370	— 18

EXPORTS	Kron. thous.	Inc. or dec.
Motors and generators (Great Britain)—		
Total	8,939	— 3,694
Great Britain	1,777	+ 609
Transformers (France)—		
Total	2,325	— 2,105
Starting and regulating resistances (Spain)—		
Total	465	— 329
Stators, rotors, current collectors, etc. (France)—		
Total	3,000	— 1,560
Great Britain	460	+ 10
Switchgear (Great Britain)—		
Total	980	+ 250
Great Britain	486	+ 422
Telegraph and telephone apparatus (Mexico)—		
Total	14,960	— 550
Insulated wires and cables (Mexico)—		
Total	3,094	— 2,212
Great Britain	32	+ 12
Metal-filament lamps (Norway)—		
Total	530	+ 491
Carbon for electrical purposes (Germany)—		
Total	274	— 91
Radio apparatus (Greece)—		
Total	2,660	— 1,550
Batteries and accumulators (Russia)—		
Total	3,240	— 272
Great Britain	13	— 41
Vacuum cleaners—		
Total	8,100	— 2,520

Conditions in Switzerland

IN a Department of Overseas Trade report on the economic conditions in Switzerland (H.M. Stationery Office, 1s. 6d.), the Commercial Secretary to H.M. Legation at Berne says that the country for a long period was unaffected by world conditions, but the number of unemployed was nearly doubled between August and November, 1931.

The comparative prosperity of the electrical industry was unexpectedly well maintained during the early stages of the crisis, but the slowing down of business which set in during the first six months of 1931 gradually reduced the booking of orders to about two-thirds of the 1930 level. Subsequent events in the economic world, including the suspension of the gold standard by Great Britain, dealt severe blows to the already shaken confidence of buyers and demand was consequently reduced to a minimum.

The leading firms in the industry reduced manufacturing costs with a fair measure of success by cutting down wages, salaries, and overheads. They were helped in this by the falling prices of raw materials and semi-manufactured goods. Business was so low, however, and production so limited that, by the beginning of 1932, manufacturers had not yet been able to reap any appreciable benefit from the cheaper output, the small number of orders on hand proving inadequate fully to cover even the reduced expenses.

In the present circumstances the continuance of State railway electrification and the growing use of domestic electrical appliances provide some measure of relief on the home market, but the prospects for the future, especially abroad, do not leave any hope of immediate improvement and most firms have introduced short time or discharged many of their employés.

A table showing the exports of electrical goods and apparatus during 1931 was published in our issue of August 12th (p 226). Local production enables the electrical industry to cover the greater part of its requirements in semi-finished and finished materials, but some articles, such as mica, bakelite, ebonite, and similar goods, various classes of insulators, and dynamo sheet have to be imported to a certain extent, Germany being the largest supplier.

A good deal of work is being done by the Telegraph and Telephone Administration with a view to developing the telephone system. Automatic exchanges serve all large towns, their suburbs and many rural districts, and automatic operation has also been applied to trunk traffic between a few centres. Overhead lines are being gradually replaced by underground cables, which make up 31.2 per cent of all circuits, a further 66.5 per cent of circuits being partly by overhead lines and partly by underground cables.

Except for the large automatic exchanges, which are equipped with Belgian and German plant, the telephone equipment in use in Switzerland is of local manufacture. Subscribers increased from 215,135 in 1930 to 228,900 in 1931, the number of lines showing a corresponding increase from 297,930 to 324,088. The development of traffic in 1931 amounted to 8.67 per cent. The figures for the first two months of 1932 show that the expansion in telephone traffic is being maintained in the face of the prevailing economic difficulties.

The reorganisation of Swiss broadcasting in 1930 has given a marked impetus to the radio trade and has resulted in an appreciable increase in the number of licences for receiving sets, of which there were 167,272 at the beginning of March, 1932, as against only 103,808 early in 1931. The revenue derived from licences in 1931 was 2.0 million francs, of which 1.7 million francs was placed at the disposal of the Swiss Broadcasting Society for programmes and propaganda, the balance being retained by the Post Office for the working and maintenance of the plant.

Bolton and Electrical Trading

At a recent meeting of Bolton Corporation Electricity Committee, a letter was received from the secretary of the Bolton Chamber of Trade, protesting against the alleged practice of the Corporation Electricity Fittings Department in cutting the prices of a number of fixed-priced proprietary articles, and requesting that the cause of complaint be remedied. The communication was referred to the chairman and borough electrical engineer.

The Corporation Housing Committee has also received a communication from the secretary of the Bolton Chamber of Trade (electrical contractors' section) with regard to the carrying out of electrical work in connection with Corporation housing estates, stating that he would be pleased to learn that private contractors would be given an opportunity of quoting for electrical work on the Johnson Fold Estate. The Committee has decided that tenders shall be invited for the electrical installations on this estate

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Australian Tariff Revisions

The *Board of Trade Journal* publishes particulars of the revisions which the Australian Government has made in its Customs tariff; these alterations operate as from September 2nd. From the schedule it is observed that the goods covered by Items 179 (D), (1) and (2) (electrical machinery, &c.), have been reclassified and the arrangement is as follows, the new *ad valorem* duties being stated in each case.

	British Preferential Tariff.	General Tariff.
179 (D) (1)		
(*a*) Induction type a.c. machines :—		
Not exceeding 150 h.p.	45%	60%
Exceeding 150 h.p.—Percentage rate reduced by 1 per cent. for each h.p. above 150 with minimum	Free	15%
Variable speed commutator a.c. machines with maximum and minimum speeds having a ratio at least two to one	Free	15%
Other a.c. machines, including exciters :—		
(*a*) 2 h.p. up to 125 inclusive	20%	40%
(*b*) Exceeding 125 h.p.	Free	15%
(*b*) Convertors, motor or synchronous rotary :—		
(1) Not exceeding 10 kW	45%	60%
(2) Exceeding 10 kW	Free	15%
(*c*) (1) d.c., namely, traction motors and motors for gearless lifts	45%	60%
(2) Other, not exceeding 20 kW	45%	60%
(3) Exceeding 20 kW	Free	15%
(*d*) Dynamo-electric machines, n.e.i.	45%	60%
179 (D) (2)		
(*a*) Static transformers below 66,000 V :—		
(1) Not exceeding 10,000 kVA	45%	60%
(2) Exceeding 10,000 kVA—the percentage rate under (1) is to be reduced by 0.009 for each kVA. above 10,000 with a minimum rate of duty of	Free	15%
(*b*) At 66,000 V :—		
(1) Not exceeding 1,000 kVA	45%	60%
(2) Exceeding 1,000 kVA—the percentage rate under (1) is to be reduced by 0.09 for each kVA. above 1,000, with a minimum rate of duty of	Free	15%
(*c*) Over 66,000 V	Free	15%
(*d*) Induction coils for all purposes unless expressly provided for	45%	60%

Item 179 (D) (6) covering parts of a.c. motors, from 1 to 125 h.p., has been deleted.

With these revisions the Commonwealth Government announces the removal of the import prohibitions upon several classes of goods, among them being radio receiving sets, radio headphones, and batteries and accumulators (but not dry cells or batteries).

Ediswan Lamp Publicity

Particulars of the Edison Swan Electric Co.'s lamp publicity for the forthcoming lighting season have now come to hand.

The main feature of the lamp displays takes the form of an illuminated centre piece (illustrated herewith), consisting of a backboard printed in graduating blues representing a night sky. Projecting from this is a disc with the planets of the solar system, the larger constellations being illuminated permanently, while the lamp on the right-hand side of the carton is illuminated by a flasher. Around this disc is the slogan "The Wonder Lights of the Night," which is illuminated by the same lamp that illuminates the constellations, and beneath the disc is a half sphere with the words "Royal Ediswan

An "Ediswan" illuminated centre piece with two triangular showcards

Lamps." In addition, there are two triangular showcards, which are fitted with a suitable strut to take a lamp, one green and one red. Around the centre piece are stacked "Royal Ediswan" lamp cartons, the whole being finished off with a background of crêpe paper in colours to harmonise with the centre piece.

Other publicity materials include a window display leaflet (No. L. 817), a hanging price card and window bill printed in nine colours, a general lamp catalogue (No. L. 802), a small price card (No. L. 800), and a folder (No. L. 801), the last two being available for over-printing.

British Overseas Electrical Trade in August

WHILE electrical exports during August showed a decrease of 4 per cent. as compared with the preceding month, imports rose by 5 per cent. The complete analysis of the month's electrical trade is tabulated below.

There were increases of £15,422, £9,671, £650 and £314 in the electrical machinery purchases of South Africa (£33,290), Australia (£15,020), New Zealand (£6,346), and Canada (£8,097), respectively, as compared with July, but there was a considerable falling off in the shipments to European countries (£82,768, against £114,211), South American countries (£9,721, against £17,172), British India (£86,696, against £93,574), and "other countries" (£34,675, against £52,876).

Compared with August, 1931, the brightest feature of the electrical machinery market is the substantial increase of £55,602 in the goods despatched to British India. South Africa and Australia also increased their purchases by £8,037 and £9,110 respectively. The largest decreases are recorded in the exports to European countries (£60,366 decrease), South American countries (£18,739 decrease), and "other countries" (£15,885 decrease).

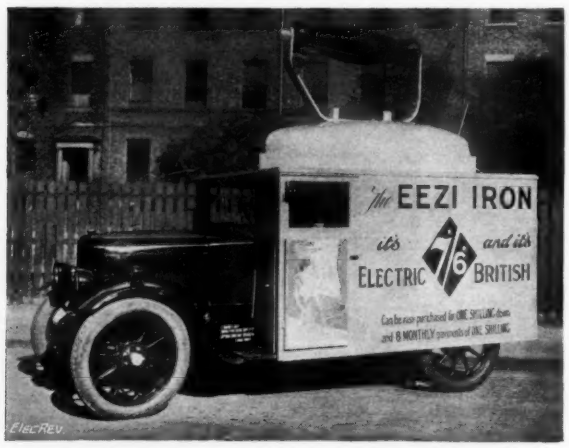
	Exports.			Imports.			Re-Exports.		
	Electrical exports for Aug., 1932.	Inc. or Dec. as compared with July, 1932.	Inc. or dec. as compared with Aug., 1931.	Electrical imports for Aug., 1932.	Inc. or dec. as compared with July, 1932.	Inc. or dec. as compared with Aug., 1931.	Electrical re-exports for Aug., 1932.	Inc. or dec. as compared with July, 1932.	Inc. or dec. as compared with Aug., 1931.
Insulated wires and cables ...	£84,193	+ £6,534	− £28,104	£16,840	+ £4,427	− £14,176	£287	+ £260	− £6
Electric carbons	796	− 1,530	+ 430	8,571	− 940	− 5,652	17	− 2	− 88
Arc lamps and searchlights ...	578	+ 432	− 81	—	− 517	− 125	—	—	− 12
Incandescent lamps	29,039	− 5,629	+ 9,669	12,117	− 2,661	− 21,050	592	− 55	+ 376
Other lighting apparatus ...	23,684	− 40	+ 1,320	24,230	+ 5,662	− 24,960	819	− 1,478	− 425
Batteries and accumulators ...	48,403	+ 134	+ 403	5,778	+ 2,394	− 54,820	212	+ 161	− 191
Meters and instruments ...	19,438	− 10,990	− 2,539	23,563	− 5,623	− 13,051	322	− 291	− 541
Unenumerated electrical goods and apparatus	72,997	− 1,648	− 18,152	47,666	+ 1,683	− 38,602	2,521	− 705	− 1,578
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)	17,292	+ 6,286	− 10,482	899	+ 264	− 684	72	− 99	+ 70
Submarine telegraph and telephone cables	17,888	+ 13,872	+ 12,680	—	—	—	—	—	—
Telegraph and telephone apparatus	123,999	+ 982	− 2,540	103,378	+ 40,005	− 1,495	957	− 4,448	− 4,446
Electrical Machinery—									
Railway and tramway motors	5,155	− 1,909	+ 3,072	—	—	—	—	—	—
Other motors and generators	65,281	− 50,345	− 76,085	—	—	—	—	—	—
Unenumerated electrical machinery	206,434	+ 14,029	+ 43,801	75,893	− 28,097	− 9,521	4,563	+ 304	− 1,060
Total	£715,177	− £29,822	− £66,608	£318,935	+ £16,597	− £214,136	£10,362	− £6,353	− £7,901
Decreases for the first eight months of the year... ...	Exports. £1,870,910			Imports. £1,990,790			Re-exports. £79,431		

British Honduras Tariff Modifications

A new ordinance has been issued which makes certain modifications to the customs tariff of British Honduras. According to the *Board of Trade Journal* the new ordinance embraces the following:—Radio apparatus, including parts and accessories: British preferential tariff, 10 per cent. *ad valorem*; general tariff, 20 per cent. Machinery for electric lighting and power for industrial purposes, including parts: British preferential tariff, free; general tariff, 5 per cent. The ordinance also imposes a surtax of 25 per cent. of the existing duties on certain articles including electrical dental appliances, radio apparatus, parts and accessories, and other kinds of electrical apparatus, other than machinery.

Electric Iron Campaign at Newcastle

The Newcastle-upon-Tyne Electric Supply Co., Ltd., has recently put into commission the electric iron advertising and



The N.E.S. Co.'s iron advertising and sales van

sales van shown in our illustration. When loaded with irons this van is used to tour the rural and colliery villages in the company's supply area, and as the sales staff who travel with it are supplied with pedlars' licences, intensive door-to-door sales campaigns can be organised. It is also proposed to sell irons and other apparatus from the van itself when it is parked in villages, &c., on market days.

Registered Electrical Contractors

At a recent meeting the Executive Committee of the National Register of Electrical Installation Contractors accepted applications for registration from the following:—

J. Blackburn, Hollinwood, Lancs.
W. J. Rigg, Gorton, near Manchester.
A. T. Costigan, Perry Barr, Birmingham.
A. Moffett & Sons, Corbridge-on-Tyne.
Edstan Electric, Hanley, Staffs.
R. L. Bradshaw, Moston, Manchester.
W. S. Wright, Blackley, Manchester.
W. G. Senior, Blackburn.
J. W. Crawford, Jarrow-on-Tyne.
C. Ross, Oldham.
Reigate Electrical Co., Reigate, Surrey.
H. E. Gosnell, Colchester.
Mayhew Bros., Apsley, Herts.
E. Henderson, Newton-le-Willows.
O. R. Porteous, Hexham, Northumberland.
J. L. Shadwell, Fulham.
McWhirter & Sons, Ltd., Cardiff.
L. T. Robins, Gloucester.
E. W. Lee & Co., Liverpool.
E. Spurr, Earlestown, Lancs.
W. Collier, Urmston, Manchester.
Marsh & Co., Prescot, Lancs.
Burtons, Walton, Liverpool.
W. A. Phillips & Sons, Cowbridge, Glam.
Sunderland Forge & Engineering Co., Ltd., Belfast.

At the same meeting three applications were withdrawn and seventeen declined.

Derby and Notts Co. Fined

Arising out of a fatality which occurred at its Heanor substation, when a workman named Carmen was killed by coming into contact with a live wire, the Derbyshire and Nottinghamshire Electric Power Co. was fined at Heanor, on September 12th, £50 and 40 guineas costs for four infringements of the Factory and Workshops Acts. It was alleged that vertical conductors connecting a surge absorber and switchboard were not made dead, by reason of which Carmen was killed.

Mr. Wm. Maxwell, district engineer to the company, said that he gave instructions for some insulators to be cleaned and Carmen was only carrying out work in a manner in which it had been done upon previous occasions; the conductors had never been cut out before for this particular work. Mr. P. Ormiston, assistant engineer, expressed the view that the cause of the accident was an atmospheric disturbance. He considered that Carmen was in a comparatively safe position.

In announcing their decision the chairman indicated that the magistrates regarded the case as being one of a very serious character.

Electrical Fittings Inquiry from Canada

H.M. Trade Commissioner at Vancouver reports that a Calgary firm desires to be placed in touch with United Kingdom manufacturers of electrical fittings, particularly of the dust and damp proof type. Further details may be obtained from the Department of Overseas Trade, 35, Old Queen Street, S.W.1. Reference No. G.X. 11843 should be quoted.

Ever Ready Window Display Competition

Full details of the window display competition which is being organised by the Ever Ready Co. (Great Britain), Ltd., from September 26th to October 8th, are now available. Four special prizes of £100 are offered, as well as eight of £50 and £25 each, and forty consolation prizes of £5. Special free local advertising for dealers is being arranged.

Carbon Electrode Duty Suspended

The Treasury has made an Order exempting amorphous carbon electrodes over 3 ft. long, the cross-section of which exceeds 12 in. in both length and breadth with longitudinal slots exceeding 2 in. in width and 4 in. in depth, from key industry duty from September 7th, 1932, to December 31st, 1933. The Order will shortly be published by the Stationery Office.

The Netherlands East Indies Radio Market

A Department of Overseas Trade report on the market for radio apparatus in the Netherland East Indies states that radio sales are practically controlled by Dutch and German manufacturers and there is little prospect of an increase in the sale of United Kingdom products. It has been suggested by local dealers that producers in England should form a selling combine and endeavour to come to an arrangement with the Dutch manufacturers for the unrestricted sale of sets and components.

Social Event

A golf match between representative teams of the Institute of the Plastics Industry and the Institution of Rubber Industry was played over the Moor Park Course on September 7th. The teams were captained by Mr. C. C. Last and Mr. R. L. S. Nye respectively and a very close and thoroughly enjoyable match ensued, resulting in a win for the Rubber team by three matches to two with one halved.

Trade Announcement

Mr. E. G. Pulford, Jun., who for many years has been with Pulford Bros., electrical engineers, of Liverpool, has started a business as an electrical contractor and retailer at 83, Seaview Road, Wallasey, as the Pulford Electric Service.

Norwegian Duty on Radio Apparatus

The duty on radio apparatus imported into Norway has been advanced from 18 to 36 per cent. of the c.i.f. value, the temporary duty surtaxes hitherto imposed being now included.

Grossly Exaggerated

In the advertisement of the Cambridge Instrument Co., Ltd., which appeared in our issue of September 2nd (page xlv) a misprint (the accidental substitution of "m" for "in") made it appear that the virtual length of the scale in the above instrument was 20 metres! Although a feature of this new indicator is the magnification of the scale, this is not so enormous as to give a virtual length of 66 ft. with an instrument only 8 in. wide! For the indicator shown in the advertisement the figure should, of course, be 20 *in.*, although with a modified form of indicator a virtual scale length of 40 in. can be obtained.

Works Visit

A number of well-known members of the radio trade, mainly directors of factoring and wholesaling concerns, recently paid a visit to the Mitcham factory of Philips Lamps, Ltd., where they were conducted through the various departments and shown the company's products in the making.

Enterprise at Farnworth

The Farnworth (Lancs) municipal supply undertaking has been making rapid progress for some years by connecting up some eighty services per month. The population is about 28,000, and about 7,000 houses and 5,100 domestic consumers are on the department's books.

During August the undertaking made a special effort to stimulate the use of wash boilers, there being only twenty connected to the mains. Intensive advertising in the local Press, and by handbills, was employed, and a coupon system was introduced whereby the hirer of a wash-boiler was granted a remission of the first quarter's charge. The campaign lasted three weeks.

The Council has its own contracting department, employing seventeen wiremen with improvers and apprentices; they are kept fully occupied and carry out 90 per cent. of all the wiring in the area. The department's five jointers, their mates, and meter readers were offered a prize for the one who was successful in obtaining the greatest number of signatures on the coupons. The result of the effort surpassed the most sanguine expectations of the chief electrical engineer, Mr. A. J. Hutchinson. He anticipated that they would put out 100 wash boilers by March 31st next, but actually 111 were connected to the mains in the three weeks, and they are still going out at practically the same rate. The wash boiler supplied is of the "Burco" type. Mr. Hutchinson proposes to take the same line with cookers, radiators, kettles, irons and other appliances, dealing with them separately in each case.

The Timber Market

Our Timber Trade Correspondent reports that the spot market for European woods has shown a much better tone within the past fortnight. Canadian woods are in quiet, steady demand. Hardwoods generally are slow of sale, but there is increasing inquiry for Empire mahogany and other hard and fancy woods, including the choice home-grown varieties. The American woods are likely to become firmer here.

Callender's London District Offices

The London district and local contract offices of Callender's Cable and Construction Co., Ltd., have now been centralised at Hillmarton Road, Caledonian Road, N.7, where they are

Callender's London district offices

admirably situated for transport facilities in London and the Home Counties, and convenient of access for customers by train, underground, bus and tram services.

Recent Contracts

The British Thomson-Houston Co., Ltd., has recently received an order from the Blackpool Tower Co., Ltd., for a band relay public address equipment, which comprises 40-W power amplifiers totalling 280-W undistorted output, feeding forty-four loudspeakers. The equipment will be used to link up the café lounges, fair ground, circus and dance hall in the Tower, Winter Gardens and Empress Ballroom.

The Cape Asbestos Co., Ltd., has secured a contract for lagging in connection with the Barking power station. The "Caposite" lagging which will be used is manufactured entirely from amosite asbestos from the company's mines in the Transvaal.

Standard Telephones and Cables, Ltd., has received an order from the General Post Office for the supply of 25 miles of quadded telephone cable—principally of the armoured underground type—for the Horsham-Pulborough line.

Greyhound Racing Track Illumination

Experts who have visited the Firs Greyhound Racing Track, Aylsham Road, Norwich, have expressed the opinion that it is the finest illuminated track in the country. For the electrical installation, which was carried out by Messrs. Fisher's of Bridewell Alley, Norwich, 1,200 yards of "Henley" P.B.J. 19/.044 cable was used, together with a quantity of "Bondit" wiring system and over 1,000 yards of "Henley" v.i.r. wires, from 3/.029 in. to 19/.052.

For Sale

The Isle of Wight Electric Light & Power Co., Ltd., has gas engines for disposal.

(See our advertisement pages to-day.)

New Catalogues and Lists

Electric Domestic Appliance Co., Kingstanding Road, Perry Barr (Handsworth), Birmingham.—A brochure entitled "Helping to Build the Domestic Load," describing the company's policy of selling electrical appliances solely through the supply companies.

Renold & Coventry Chain Co., Ltd., Renold Works, Didsbury, Manchester.—A 112-page catalogue of products for industrial applications.

John Shaw & Sons, Ltd., Wolverhampton.—The new season's catalogue of domestic apparatus, including a number of appliances recently introduced.

Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, E.C.4.—Publication No. 1,606, dealing with laboratory machinery.

Brook Motors, Ltd., Empress Works, Huddersfield.—Four leaflets relating to the company's motors.

Cressall Manufacturing Co., 31 & 32, Tower Street, Birmingham.—Lists Nos. 39 and 40, giving particulars of sliding and projector resistances respectively.

Edison Swan Electric Co., Ltd., 123-125, Queen Victoria Street, E.C.4.—A booklet entitled "The Story of Light," giving a short account, illustrated by a number of coloured pictures, of the evolution of the "Royal Ediswan" lamp.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—Six brightly coloured posters relating to radio receivers, radiogramophones, and batteries. Also several leaflets regarding reductions in prices and hire-purchase schemes, and a new window pelmet in four sections.

W. Canning & Co., Ltd., 133-137, Great Hampton Street, Birmingham.—A booklet on electro-deposition in the making of printing plates and cylinders.

Chloride Electrical Storage Co., Ltd., Exide Works, Clifton Junction, near Manchester.—A broadsheet announcing a new range of "Drydex" torches.

Ferranti, Ltd., Hollinwood, Lancs.—An illustrated folder on the seven-valve a.c. mains superheterodyne radio "consolette" fitted with an electric clock and station name dial.

Britannia Batteries, Ltd., 233, Shaftesbury Avenue, W.C.2.—A folder outlining the characteristics of the new "Britannia" sealed stationary cell.

Varley (Oliver Pell Control, Ltd.), 103, Kingsway, W.C.2.—Copies of the company's radio receiver and component catalogues.

Hewittic Electric Co., Ltd., Hersham, Walton-on-Thames.—Two publications dealing respectively with photographic studio lighting and rectifiers for cinema work.

S. O. Bowker, Ltd., 20, Branston Street, Birmingham.—A booklet describing in detail the "Tenby" wiring system.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.1.—Copies of the Philips radio catalogue, general lamp leaflet, and "Philinea" lamp leaflet.

Holden & Brooke, Ltd., Sirius Works, West Gorton, Manchester.—Lists Nos. 792 and 845 dealing respectively with the "Junior" and type "G.H.B." electrically driven pumps.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, W.C.2.—The September issue of the "Link," containing details of modern lighting equipment for bedrooms, &c. Also a leaflet on commercial lighting units.

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1.—Catalogue No. 666, giving full particulars of "Efesca" electric cookers, domestic appliances and fires.

A. Broderson, 11, Northampton Square, Goswell Road, E.C.1.—An illustrated leaflet relating to the "Stella Vita" ultra-violet-ray lamp.

James Gordon & Co., Ltd., Windsor House, Kingsway, W.C.2.—Pamphlet No. H.5, dealing with the "Hagan" system of pressure reduction and de-superheating.

Kandem Electrical, Ltd., 711 & 715, Fulham Road, S.W.6.—The "Kandem Quarterly Review" containing details of the company's street lighting equipment.

Bankruptcy Proceedings

J. Brown, radio dealer, &c., 334, Goswell Road, E.C.—A sitting of the London Bankruptcy Court was appointed to be held on September 6th for the public examination of this debtor. The receiving order was made on June 11th upon the petition of Celestion, Ltd., the act of bankruptcy alleged being the departure of the debtor on February 18th with intent to defeat and delay his creditors. An order of adjudication was made on July 5th. The Official Receiver reported that the debtor had not surrendered to the proceedings, and nothing was known concerning his present movements. The examination was adjourned *sine die*. The Electrical Trading Association, Ltd., has tendered a proof of debt for £90.

A night view of the Firs Greyhound Racing Track, Norwich

J. H. Maddox (Imperial Electrical Supplies Co.), dealer in electrical accessories, 9, Adolphus Road, Finsbury Park, N.—Receiving order made September 5th on debtor's own petition. First meeting September 19th, and public examination November 18th, both at Bankruptcy Buildings, Carey Street, W.C.

H. E. Daft, electrical engineer, Gloucester Place, Monument Street, Peterborough.—Trustee, Mr. W. J. Adnitt, Oriel House, New Road, Peterborough, released June 16th.

N. Sutton (Sutton's Wireless Service), 169, High Street East, Wallsend.—Last day for receiving proofs for dividend September 24th. Trustee, Mr. R. Betts, 31, St. Mary's Place, Newcastle-upon-Tyne, Official Receiver.

G. F. Gilbert, electrical engineer, 60, Nottingham Road, Nottingham.—Last day for receiving proofs for dividend September 24th. Trustee, Mr. L. A. West, 22, Regent Street, Park Row, Nottingham, Official Receiver.

Company Liquidations

Milford, Ltd., wireless valve and electric lamp manufacturers, Lower House Mills, Bollington, near Macclesfield.—The statutory meeting of creditors was held recently at the offices of Messrs. Trotter, Davies & Yearsley, 27, Brazennose Street, Manchester, when the statement of affairs showed liabilities of £795, all due to unsecured creditors, and total assets of £114. After allowing £40 for preferential claims, the net assets were £75, leaving a deficiency of £720. The deficiency was accounted for by the writing down of the assets and losses on trading. It was decided that Mr. Yearsley should be appointed liquidator of the company, with a committee of inspection.

Lowdens Valves, Ltd., wireless manufacturers, 4, Half Moon Street, Piccadilly, and Southall.—A report issued by the Official Receiver (the liquidator) states that no account has been filed under the liquidation as there are no books and documents now in existence from which they could be prepared. The liabilities, however, are not expected to exceed £642 and the assets are valued at £3. The company's failure and insolvency are attributed to a fire which destroyed the whole of its property.

Electrical Utilities, Ltd.—Meeting October 6th at 10, Castle Bar Park, Ealing, W., to receive an account of the winding-up by the liquidator, Mr. F. S. Mills.

Receivers Appointed

English Plastics, Ltd., Slough.—Mr. Frank Harper, 3/4, Clements Inn, W.C.2, was appointed receiver and manager by the debenture holder on August 10th.

A. C. Wells & Co., Ltd., Carnarvon Street, Cheetham, Manchester.—Mr. S. Pell-Ilderton informs us that the company is to be carried on under his supervision as receiver and manager.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

	Price Sept. 14th.	Fortnight's Inc. or Dec.
CHEMICALS, Etc.		
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£17	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	¼d. inc.
a Shellac T.N. ... ... per cwt.	£3 15s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, Etc.		
b Aluminium, Ingots ... ... per ton	£95 to £100	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/1½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£139	£3 inc.
Grade II ... ... ,,	£100	£4 inc.
Grade III ... ... ,,	£55	£3 inc.
c Brass (rolled metal 2" to 12" basis)... per lb.	7¼d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	9¼d. to 9¾d.	¼d. inc.
c ,, Wire, basis ... ... ,,	7¾d.	¼d. inc.
c Copper Tubes (solid drawn) ... ... ,,	10¼d.	¼d. inc.
g ,, Bars (best selected) ... ... per ton	£68	£3 inc.
g ,, Sheet ... ... ,,	£68	
g ,, Rod ... ... ,,	£68	
g ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets... ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£42	—
d ,, ,, H.C. Wire ... per lb.	6¼d.	—
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5¼d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i ,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£14 5s.	15s. dec.
g Mercury ... ... per bot.	£9 10s. to £9 15s.	2s. 6d. inc.
e Mica (in original cases) small ... per lb.	6d. to 8/6	—
e ,, ,, medium ... ,,	4/– to 8/–	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	11d.	¼d. inc.
p ,, ,, rolled strip & sheet ,,	11d.	¼d. inc.
p ,, ,, wire ... ... ,,	11¼d.	¼d. inc.
o Platinum ... ... per oz.	£9 15s.	—
d Silicium Bronze Wire... ... ... per lb.	7¾d.	—
r Steel, magnet, in bars... ... ... ,,	7¼d.	—
g Tin, Block (English) ... ... per ton	£149 5s. to £151 5s.	£1 15s. dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
India-Rubber, Gutta-Percha and Telegraph Works Co. Ltd.
f James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Electricity Supply

Lighting, Domestic, Power

Aldershot.—CHEAPER ELECTRICITY.—The Town Council has adopted an alternative two-part tariff, with a "unit" charge of 1d., and has reduced the flat rate from 6d. to 5½d. per kWh, and that for prepayment meters from 8d. to 7½d. A new tariff has also been adopted for shops and other non-domestic premises, with a fixed charge per 100 watts of lighting capacity installed, and a "unit" charge of 1d.

Birkenhead.—LOANS SANCTIONED.—The Electricity Committee has obtained sanction to loans of £3,500 for domestic apparatus for the assisted wiring scheme, and £2,275 for plant.

Bradford.—TRANSFORMER PLANT.—The Electricity Committee has approved the provision of transformer equipment at Bowling Dyeworks for the Bradford Dyers' Association, Ltd., at an estimated cost of £2,215. Mains extensions, costing approximately £2,550, to the B.D.A. branch works in the Thornton Road area have also been approved.

Caernarvonshire.—AN ELECTRICAL DEVELOPMENT COMMITTEE.—There is being formed in Caernarvonshire a county electricity committee, to which all councils of importance are being asked to appoint representatives. The purpose of the committee is "to take such steps as may be found advisable to promote and encourage the distribution of electricity to all parts of the county."

Canada.—THE ST. LAWRENCE WATERWAY.—According to *The Times*, the Dominion Government has announced its approval of the plans for the general works of the Beauharnois Power Corporation project, which will include a 14-mile canal between Lake Saint Francis and Lake Saint Louis, west of Montreal. The agreement for the transfer of this canal, which will form a link of the St. Lawrence waterway, to the Dominion Government has been drafted, and will be signed soon. The company is authorised to divert water from the St. Lawrence into the canal, and before the end of this month water will be introduced into the canal to enable the company to fulfil its contract to deliver 35,000 h.p. to the Ontario Hydro-Electric Power Commission by October 1st as a first instalment of 250,000 h.p. to be delivered at the end of five years.

Cardiff.—A SUPPLY FOR THORNHILL DISTRICT.—The Electricity Committee is to extend mains at a cost of £1,500 to provide a supply to the Thornhill district.

Carlisle.—BULK SUPPLY FOR GILSLAND.—In response to an application from the Newcastle-upon-Tyne Electric Supply Co., Ltd., the Electricity Committee has decided, subject to the approval of the Electricity Commissioners, to give a bulk supply for distribution by the company to premises in a portion of Gilsland.

Carnwath (Lanarkshire).—INAUGURATION OF SUPPLY.—The inauguration of the electricity scheme at Carnwath was carried out on September 3rd, when the supply was formally switched on by Mr. Andrew Smith in the presence of a large number of people.

Castle-Douglas.—SUPPLY INAUGURATED.—A supply of electricity was inaugurated on September 3rd by Mrs. D. C. Welsh, convener of the Lighting Committee of the Town Council.

Colchester.—WAYLEAVE INQUIRY.—A public inquiry was held at the Town Hall on September 7th by Mr. F. Gordon Tucker on behalf of the Ministry of Transport into an application by the Corporation for a compulsory wayleave over land at Fingringhoe.

Mr. G. Hetherington, for the Corporation, said that it was proposed to place six poles and one stay on the land of Mr. D. Abbott Green. Mr. Green had never objected to the proposal, but he maintained that he should be treated in the same way as another consumer, who for special reasons was given a free service. The Corporation could not, however, see its way to treat the two cases alike.

Mr. Green said that he was endeavouring to sell the land for development, and was advised that the presence of the line along the frontage would reduce its value. Mr. Hetherington replied that the availability of an electricity supply would probably enhance the value of the property.

The inquiry was then closed.

Continental.—RUSSIA.—In addition to the hydro-electric station at Kamyshin on the Lower Volga, referred to in a recent issue, the construction of three hydro-electric stations in the Central Volga basin has been decided upon by the Government. One is to be built in the Ivanovo-Voznesensk area, the second in the Nizhni-Novgorod district, and the third on the Kama River, a tributary of the Volga, near Perm. Their combined power will be between 800,000 and 1,000,000 kW. The construction is to be carried out by an organisation called the "Sredvolgostroi," which has been specially established for the purpose and will be under the charge of Mr. A. V. Winter, who is also in charge of the construction of the Dnieprostroi installation. The Sredvolgostroi is to take over the personnel and the entire organisation of the Dnieprostroi, which is to be gradually transferred to the various construction centres on the Volga as the operations at Dnieprostroi are completed. The Commissariat for Heavy Industries is to complete the plans of the three hydro-electric stations by October 1st and the con-

struction is to be completed by the spring of 1935. The project is regarded as of considerable importance for the further development of the Ivanovo-Voznesensk province, one of the oldest and most important industrial areas in the Soviet Union. The construction of the first of the hydro-electric stations planned for the Kama River will also be of great importance to the area round Perm. The power generated by the Perm station will be used by the factories of Nizhni-Taghil and the Central Urals, the industrialisation of which has been carried out in recent years at an exceptionally rapid rate.

GERMANY.—The output of the 122 principal electricity supply undertakings in Germany during May last amounted to 976.8 million kWh, bringing the total for the first five months of the year to 5,269.2 million kWh, as compared with 6,070.7 million kWh in the corresponding period last year.

Crewe.—INCREASED DISCOUNTS.—The Town Council has increased the discount for payment of electricity accounts within 14 days from 2½ to 5 per cent.

Dewsbury.—SUPPLY ARRANGEMENTS.—The Town Council has consented to a supply of electricity being given to the Spen Valley Dairy Co., Ltd., Mill Street East, and to another consumer by the Yorkshire Electric Power Co.

Distington.—PUBLIC LIGHTING.—The Parish Council has accepted, subject to the approval of the Rural District Council, the offer of the Mid-Cumberland Electricity Co., Ltd., for public lighting under a 20 years' agreement.

Doncaster.—MAINS EXTENSIONS.—At the request of the Bentley-with-Arksey Urban District Council the Town Council has decided to extend mains to the housing site off Arksey Lane.

Dover.—THE BULK SUPPLY QUESTION.—A report has been received from Mr. Highfield, the Corporation's adviser, regarding the question of a bulk supply of electricity. He states that he is still of the opinion that it is advisable for the Council to take a bulk supply. He draws attention to the fact that if consent could be obtained for the installation of a 2,500-kW generating set, it would not be possible to place further plant in the existing station, and a new station would have to be erected, in seven or eight years' time, at a cost of from £100,000 to £125,000. Any increased output during the seventh year, due to improved load factor, would cost at least 0.37d. per kWh to generate, as compared with 0.2d. in bulk. By taking a bulk supply the Corporation would be relieved of the necessity of raising more capital for generation, and could afford a lower rate to the long-hour consumer. The Town Council has decided to request the Central Electricity Board to receive a deputation with a view to securing a reduction of the Board's quotation of £3 15s. 6d. per kW for a bulk supply.

East Grinstead.—THE CHANGE-OVER.—The Urban District Council has received sanction to a loan of £2,638, part of £3,026, for works in connection with the change-over.

Grantown-on-Spey.—STREET LIGHTING DISPUTE.—The Town Council of Grantown-on-Spey and the Grantown-on-Spey Electric Supply Co. have not yet adjusted their differences with regard to the contract for street lighting. An appeal was made to the Electricity Commissioners by the company, which suggests that the Town Council has a desire to defer indefinitely any actual construction of the parties' obligations. The Electricity Commissioners' comment is: "If the Council is not prepared to meet the company with a view to endeavouring to agree to a settlement, we do not see that we can usefully intervene further in the matter."

High Wycombe.—A SUPPLY FOR DOWNLEY.—The Rural District Council has decided to request the Wycombe Electric Light and Power Co., Ltd., to provide a supply for Downley.

Horsham.—COMMERCIAL LIGHTING.—Following an application from the local Chamber of Trade, the Urban District Council has appointed a sub-committee to meet representatives of the Chamber to discuss commercial lighting charges.

REDUCTION IN POWER CHARGES.—The power charges have been reduced from 1¼d. to 1¼d. per kWh.

RURAL EXTENSION SCHEME.—An extension scheme is in hand for the supply of electricity in various rural areas.

Hove.—TWO-PART TARIFF INTRODUCED.—A two-part tariff with a fixed charge based on floor space and a "unit" charge of ¼d. is to be introduced by the Electricity Department.

Hoylake and West Kirby.—ELECTRICITY FOR CALDY.—At a meeting held last week the Urban District Council decided to apply to the Electricity Commissioners for a Special Order authorising it to supply electricity to Caldy.

Inverness.—THE INSHES UNDERTAKING.—With reference to the negotiations between the Town Council and Mr. M. G. Panton for the acquisition of the Inshes hydro-electric undertaking, the Electricity Commissioners have expressed the opinion that on general grounds it is desirable for this non-statutory undertaking to be absorbed by the Corporation. The borough electrical engineer gives the valuation of the undertaking as £1,300, based on the second-hand or scrap value of the undertaking. Mr. Panton places the value at £2,000, and states that he gathers that the Commissioners also consider that his figure is quite reasonable. Mr. Panton is to furnish further information with regard to the undertaking generally.

Irish Free State.—E.S.B. DISPUTE SETTLED.—It is understood that the Electricity Supply Board and its employés have adjusted their differences, the immediate remedying of certain grievances having been promised.

Liverpool.—LOAN SANCTIONED.—The Electric Power and Lighting Committee has received sanction to a loan of £30,000 for the provision of a main transmission line between the Clarence Dock power station and the Paradise Street sub-station.

Lydd.—SUPPLY TO ROMNEY MARSH.—The Town Council has decided to raise no objection to the use of overhead lines by the Folkestone Electricity Supply Co., Ltd., which hopes to give a supply of electricity in the eastern end of Romney Marsh within a month or two.

New Zealand.—CHRISTCHURCH.—Mr. E. Hitchcock, general manager of the Municipal Electricity Department, has sent us a copy of his annual report for the year ended March 31st last. Revenue (£219,884) is £451 higher than in the preceding year and the total credit balance now stands at £32,712, as compared with £25,012. Sales of electricity increased from 46,285,245 to 49,100,557 kWh, though the maximum load declined from 15,145 to 15,125 kW. The increase of 752 in the number of consumers (32,466) is the lowest recorded for a number of years.

Poynton.—PUBLIC LIGHTING.—The Parish Council has accepted the offer of the Electricity Company of Macclesfield, Ltd., for public lighting.

Scarborough.—EXTERIOR LIGHTING CHARGES.—The Electricity Committee has reduced the charge for electricity for the exterior illumination and decoration of premises from 3¼d. to 2¼d. per kWh.

BULK SUPPLY PROPOSAL.—The Electricity Committee has

The Wäggital dam and power station which supplies electricity to north-eastern Switzerland. The dam is 110 metres high

authorised the chairman, the town clerk, the borough electrical engineer and the borough treasurer to take such steps as they may think advisable in connection with the proposal to take a bulk supply of electricity from the Central Electricity Board.

South Wales.—SPECIAL ORDERS.—The South Wales Electric Power Co. has applied to the Electricity Commissioners for Special Orders authorising it to supply electricity in the parish of Llangynwyd Middle and the urban district of Glyncorrwg.

Torquay.—EXTENSIONS.—The Electricity Committee is applying for sanction to a loan of £6,000, the cost of erecting the line to supply Waddeton Court and Stoke Gabriel.

Wainfleet (Lincs).—PROSPECT OF SUPPLY.—The Mid-Lincolnshire Electricity Supply Co. is awaiting the sanction of the Spilsby Rural District Council to give a supply of electricity to the town by means of overhead lines.

Westhampnett.—LIGHTING OF SINGLETON HOUSES.—The Rural District Council has consented to electric lighting being installed at the new houses being erected at Singleton, and at other houses there. The supply company will undertake the installations, and charge consumers an inclusive price of 11d. per kWh.

Traction

Continental.—ITALY.—The *Morning Post* states that Rome's first underground railway station will be inaugurated next month. The station is the terminus of the new Viterbo electric railway which crosses the Tiber just beyond the famous stream of the Acetosa and terminates on or rather under the old Flaminian road of Piazzo del Copolo. The underground station is five hundred yards long with a quadruple track capable of accommodating two trains entering and two leaving with a rapid service every five minutes. The whole line was planned and carried out in two years.

SWEDEN.—On considerable sections of the Stockholm-Malmo railway line with its junction lines the work of electrification has now been quite or nearly completed. A few days ago electric locomotives began to run on the Stockholm-Norrkoping section, and within the next year the whole electrification programme approved by the Riksdag will be carried out. It is probable that the State Railway Board will ask the Government to propose to the next Riksdag the electrification of the northern main line between Stockholm and Ange, a distance of 484 km. If this plan is approved work may begin next summer.

Dover.—TROLLEY-BUS PROPOSAL.—The Tramways Committee last week considered a scheme for the conversion of the tramways to the trolley-bus system. The manager, Mr. E. H. Bond, stated that the conversion could be carried out for about £60,000, and it was agreed to ascertain the attitude of the Ministry of Transport before proceeding to have estimates prepared.

Glasgow.—SUBWAY ELECTRIFICATION PROPOSALS.—In connection with the proposal to convert the subway from cable to electrical operation, Mr. L. MacKinnon, general manager of the Transport Department, proposes in a report that a modified experiment should be carried out on the Govan-Merkland Street-Partick section, so that practical data may be obtained which will be a guide in determining the advisability of proceeding with the complete electrification of the subway. The experiment, it is estimated, would not cost more than £2,000 and would occupy only a few months, and the electrification would reduce operating costs by 30 to 40 per cent. One saving would be the £8,000 a year which is spent on ropes. The scheme provides for the equipment of the subway cars with motors, the power for which would be obtained from the Transport Department's generating station at Pinkston, a live rail being laid throughout the tunnel. Some years ago a similar scheme was considered and the estimated cost then was £1,000,000. That scheme, however, was of a more elaborate nature and included the provision of escalators, &c. The scheme now put forward is designed to achieve the result with the lowest possible expenditure; the estimate for substituting electric power for the existing rope haulage is £100,000.

BUS STOP LIGHTING.—The Lighting and Transport Departments are experimenting jointly with indicators for lighting bus stopping places at night.

India.—DIESEL-ELECTRIC RAILCARS.—Four Diesel-electric railcars of a new type made by Sir W. G. Armstrong-Whitworth and Co., have left Newcastle for shipment to India. The new trains, which were designed especially for the Gaekwar of Baroda, and are intended for service on the 2ft. 6in. lines of the Baroda State Railways, will be the first Diesel-electric tractor units ever used on an Indian railway. Each of the railcar tractors, bodies for which are to be built in India, has been designed to haul three third class coaches, weighing thirty tons together. The railcars themselves will accommodate first and third class passengers and can be driven at both ends. The prime mover in the railcars is an Armstrong-Saurer engine developing 80 b.h.p. at 1,600 r.p.m., and 95 b.h.p. at 2,000 r.p.m. It is direct-coupled to a d.c. generator, and the complete unit, mounted on a three-point suspension system within the bonnet at one end of the vehicle, makes a very accessible arrangement for maintenance. The cars themselves are of the six-wheeled type, with a single driving axle at one end, and at the other a bogie of unusual but practical design. The axle is driven through a cardan shaft and worm gearing.

Japan.—RAILWAY ELECTRIFICATION.—As a result of a recent conference the I.G.R. has decided to postpone from September, 1933, to February, 1934, the date for the completion of the electrification of the Osaka-Kobe line. Work will be commenced on the Suita, Ashiya and Kobe sub-stations at the beginning of next September, and it is expected that the sub-stations and overhead system will be completed by the end of 1933.

A charter has been granted to the Tokyo-Yokohama Electric Railway for the extension of the Tokyo suburban system for a distance of approximately five miles at an estimated cost of 15,000,000 yen.

The Enoshima Electric Railway is to double its track for a distance of 10 km. between Kamakura and Fujisawa. Work will probably be started next month.

L.N.E. Railway.—COLOUR LIGHT SIGNALS FOR KING'S CROSS.—Colour-light signals are being installed by the London and North Eastern Railway to control, from one central control tower, the whole of the traffic movements at King's Cross Station. *The Times* says that the new signal installation includes a battery of 232 miniature levers to work sixty-three colour lights, eighty-one shunting signals to control engines and empty trains, nine route indicators, sixty-nine motors to move points, and eighty-six track circuits, the power used being electricity throughout. The whole of the lines and signals at King's Cross will be reproduced on a chart in front of the signalmen in the new signal tower, and every engine and train movement will be indicated by means of tiny spot-lights. The change over will be in two stages, on October 2nd and 30th respectively.

London.—PICCADILLY RAILWAY EXTENSIONS.—The first section of the Southgate extension of the Piccadilly Railway from Finsbury Park to Arnos Grove, which includes the intermediate stations at Manor House, Turnpike Lane, Wood Green, and Bounds Green, will be opened to the public on Monday. On the opening day 30,000 people living close to the new stations are being invited to travel free.

Manchester.—TRAFFIC SIGNALS TO REPLACE POLICE.—Twenty vacancies in the city police force are to be "filled" by the purchase of automatic traffic signals. The city engineer has reported to the Paving Committee that if automatic signals were erected without undue delay it would be possible for the Chief Constable to avoid filling twenty vacancies in the police force at an approximate saving of £5,000 per annum. The estimated cost of installing 20 sets of signals is £4,000; and the annual cost of maintenance for the half-year ending March, 1933, is £600. As all these signals are on classified roads, or at junctions with classified roads, it is reasonable, states a report submitted to the City Council, to assume that a grant from the Ministry of Transport of 60 per cent. will be available, which would be equal to £2,760. The actual saving to the Corporation on the police force would be £2,500 per annum.

United States.—NEW YORK ELEVATED RAILWAY.—According to *The Times*, a receiver in equity was appointed last week for the Manhattan Elevated Railway, the subsidiary of the Interborough Rapid Transit Co., which operates its elevated railway lines. It is intimated that the action is preliminary to an attempt to separate the two companies in the interest of the latter.

Communications

Africa.—WIRELESS IN PORTUGUESE EAST AFRICA.—A proposed law issued in Lourenço Marques provides that no wireless set may be operated without a licence. Receiving sets will receive licences free of charge, but transmitters will pay a fee. A clause states that immediately the Government installs broadcasting services owners of wireless sets will be obliged to pay charges and observe the conditions which will then be laid down.

China.—NEW INTERNATIONAL RADIO STATION.—An international wireless station was recently opened in Shanghai by the Chinese Ministry of Communications for use principally for short-wave communication with Europe and America. The station comprises three principal divisions—a central office in Sassoon House in Shanghai, a transmitting station near Shanghai, and a receiving station in Liu-hong. The three sections, which are at some distance from each other, are interconnected in such a way that the actual service can be carried out directly and uninterruptedly from the central office. Chenju, where the transmitting station is situated, is about ten miles north-east of Shanghai, and the electrical energy required for operating it is transmitted from Shanghai at 6,000 V. In case of a breakdown at the power station in Shanghai or a transmission line failure, a 80-b.h.p. Sulzer-Diesel engine, direct coupled to a 60-kW alternator, has been installed as a stand-by.

Great Britain.—RADIO EXCHANGES.—Permission to establish relay services has been refused by the Hemsworth Urban District Council to Mr. T. Clatworthy, and by the Southport Town Council to Wireless Services, Ltd.

The Little Lever Urban District Council has granted the application of a local company for permission to establish a relay service.

Cardiff Highways Committee has had another application from Broadcast Listeners Services, Ltd., for permission to operate a relay service, but has reaffirmed its previous refusal to sanction the proposal.

The Huntingdon Town Council has sealed an agreement with Messrs. H. Osman & Co., Ltd., for the installation of a relay service.

Folkestone Town Council has entered into an agreement with Folkestone Radio Relays, Ltd., for the establishment of a relay service in the borough.

Italy.—NEW STATION OPENED.—The new 20-kW broadcasting station at Bari was put into service last week. The station will later be linked with other Italian stations. It will serve chiefly the region of Apulia, Calabria, and Southern Italy.

Japan.—NEW BROADCASTING STATIONS.—The erection of a number of new broadcasting stations is being contemplated by the Japanese authorities.

Switzerland.—WORLD BROADCASTING STATISTICS.—There are in use to-day throughout the world approximately 26 million radio receivers, according to statistics published by the International Broadcasting Union at Geneva. This represents a total of about 100 million listeners, new listeners being added at the rate of about 10 million a year.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Angus.—September 22nd. County Council. Various works (including electrical) for Hillside (Montrose) housing scheme. County clerk (deposit £1 1s.).

Australia.—SYDNEY.—October 24th. Department of Public Works. Auxiliary hydro-electric plant for Hume Reservoir. (A.X. 11487.)*

Belgium.—BRUSSELS.—September 26th. Power station for the Hôpital, St. Pierre (estimated cost 1,000,000 francs). M. le President, le Commission d'Assistance Publique de la Ville de Brussels, 46, Boulevard du Jardin Botanique, Bruxelles (A. 11468.)*

Egypt.—ALEXANDRIA.—October 1st. Office of H.M. Yachts. Generating set and electrically driven pumps for the Royal Yacht *Mahronssa*. (G.X. 11778.)*

Elgin.—September 21st. Town Council. Various works, including electric lighting, for Bishopmill housing scheme.—Mr. J. Wittet, architect.

Elie (Fife).—Installation of electric organ motor and electric lighting in the Parish Church. Mr. R. Dewar, session clerk, 2, Bank Street, Elie.

Exminster.—September 23rd. Committee of the Devon Mental Hospital. Electric lamps, &c., for a period of six months. Mr. Cecil Masters, clerk to the committee.

Fife.—September 19th. Miners' Welfare Fund Committee. Heating and electric lighting at Miners' Welfare Institute at Bowhill, Cardenden. Messrs. Muirhead & Rutherford, architects, Dunfermline.

Huyton-with-Roby.—September 21st. Urban District Council. Electrically driven sewage pumping plant. Mr. H. B. Ward, 26, North John Street, Liverpool.

India.—NEW DELHI.—December 5th. Indian Stores Department. A.c. ceiling fans. (A.X. 11461.)*
October 25th. Bare copper conductors. (G.X. 11840.)*

Keighley.—September 17th. Corporation. Construction of h.p. line. Borough electrical engineer, Electricity Offices, Coney Lane (deposit £1 1s.).

London.—September 29th. Great Western Railway. Telegraph and electrical apparatus, &c. (See this issue.)

Mynyddislwyn.—September 30th. Urban District Council. Overhead and underground mains, kiosk, and sub-station switchgear. (See this issue.)

New Zealand.—WELLINGTON.—October 26th. Post and Telegraph Department. Twenty-four dry electrolytic condensers of 500 mF capacity for use on a 40-V circuit. (A.X. 11478.)*

Northern Ireland.—BELFAST.—September 26th. Electricity Board for Northern Ireland.—Metering equipment. (See this issue.)

Oban.—September 30th. Town Council. Oil engines, alternators, cooling tower, travelling crane, mercury arc rectifier kiosks, &c. (September 2nd.)
October 7th. 11-kV and l.p. overhead lines and road work. (September 9th.)

Oswestry.—September 17th. Electricity Department. E.h.p. overhead lines, switchgear, and transformers. (September 9th.)

Portland.—September 30th. County Council. Electric lighting installation at police station. County architect, Dorchester.

Ramsgate.—September 26th. Town Council. Electrical apparatus for six months. Mr. H. G. Curtis, town clerk, Albion House.

Rosslynlee.—September 24th. Midlothian and Peebles District Asylum. Various articles (including electrical fittings). Mr. C. L. Addison-Smith, clerk and treasurer, 19, Heriot Row, Edinburgh.

Salford.—September 23rd. Electricity Department. 6,600/400-V three-phase power transformers. (September 9th.)

South Africa.—JOHANNESBURG.—October 27th. City Council. Three-phase h.p. switchboard cubicles. (A.X. 11485.)*
September 30th. Government Supplies Board. Electric motors.

Stalybridge.—Parks Committee. Electric lighting at Eastwood House.

Turkey.—ISTANBUL.—October 19th. Department of Posts, Telegraphs and Telephones. 40,000 metres of cable. (A.X. 11493.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Alnwick.—Urban District Council. Accepted. Installation of electric lighting in fifty houses now under construction on the Clayport Estate (£225).—Parkers, Ltd.

Cardiff.—Hospital Committee. Accepted. Provision of sixty-eight electric clocks at Llandough Hospital (£495).—Synchronome Co., Ltd.

Carlisle.—Electricity Committee. Accepted. Two 30-kVA transformers (£101).—Bruce Peebles & Co., Ltd.

Dumfries & Galloway.—Joint Sanatorium Board. Accepted. Installation of electric lighting in houses at the Sanatorium.—Gordon & Moodycliffe.

Dundee.—Corporation Works Committee. Accepted. Electrical installation in thirty-six new houses to be erected at Clepington Road (£564).—A. Fyall.

Manchester.—Housing Committee. Accepted. Electrical installations at Barrack St. dwellings, Hulme.—H. C. Taylor & Co.
Education Committee. Accepted. Electrical work at College of Domestic Economy and Yew Tree council school.—R. Seddon & Sons.

Sleaford.—Electricity Committee. Accepted. Change-over of e.h.p. and l.p. cables, &c.—Power Lines Construction Co., Ltd. Rotary convertor, transformers, and kiosks.—Brush Electrical Engineering Co., Ltd. L.p. switchgear.—Airedale Electrical & Manufacturing Co., Ltd.

Southend-on-Sea.—Public Assistance Committee. Accepted. Installation of electric lighting at The Lavenders, Rochford (£56).—G. A. Weston.

Stretford.—U.D.C. Buildings Committee. Accepted. Electrical installation at new municipal buildings (£3,526).—Bertram Thomas. Telephone installation (£432).—Ericsson Telephones, Ltd.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the name and address of the makers of the following:—
SEAEL heating fans.
ARIEL vacuum cleaner.

Modern Street Lighting

DISCUSSING the papers on the British Standard Specification for Street Lighting read by Mr. G. H. Wilson and Mr. F. C. Smith before the Association of Public Lighting Engineers at Blackpool (ELECTRICAL REVIEW, September 9th, p. 363), Lt.-Commdr. Haydn Harrison suggested that for men used to plans the isolux method was better than the isocandle. In order to light the faces of people there should be enough illumination at five feet above the ground, but all measurements in the papers were made at ground level.

Mr. E. Stroud (Holophane, Ltd.) considered that when the public lighting authorities were able to state what they required the manufacturers would provide it. The papers offered a standard basis of comparison. Each locality must choose its class of illumination according to its wealth and its population.

Mr. C. H. Woodward (Bournemouth) compared those who attempted to carry out illumination schemes without such diagrams as the papers provided with mariners who ignored charts.

Mr. C. C. Paterson (General Electric Co., Ltd.) referred to the diagrams in the papers as simplifying a complicated question. The B.S.I. committee had evolved the specification after ten years' work and it was being used more and more. It was not perfect, but the development of the art and the evolution of the specification must go hand in hand.

Mr. H. S. Allpress (Credenda Conduits Co., Ltd.) thought the isocandle curves the more complicated than the isolux. Dr. J. S. S. Thomas objected to the isocandle diagrams as an attempt to apply a method of spherical projection to plane surfaces. He also criticised the method which the authors used in determining illumination on a horizontal basis.

Mr. G. H. Wilson, in his reply, emphasised that there was still much to be learnt about street lighting and that the specification had not yet reached finality. His experience was that if candle-power measurements were made at a distance of 10 or 12 ft. from the ground, the error due to the crossing of the rays would be only one or two per cent. Mr. F. C. Smith, also replying, urged that manufacturers should not state candle power without definition. The labour entailed in the preparation of isolux diagrams was well worth while, because in many cases street-lighting installations would remain unchanged for perhaps fifteen years. He suggested that Dr. Thomas was advocating vertical illumination, but this method involved many difficulties at present.

The Annual Luncheon

At the annual luncheon, Ald. J. P. Sanderson said that in Blackpool great attention was being paid to the lighting of the back streets. Electricity was supplied to 3,000 lamps at 1½d. per kWh and gas to 5,000 lamps at 6½d. per therm; the number of street lamps would be considerably increased in the future. He advocated the appointment of whole-time public lighting engineers for the larger towns.

The result of the ballot for the election of honorary officers was as follows: vice-president, Mr. E. M. Severn; members of council, Messrs. E. C. Lennox (N.E.S. Co.), C. H. Woodward (Bournemouth Corporation), C. S. Shapley, and J. H. Clegg. The president is Mr. Harold Davies and the secretary Mr. J. S. Dow, 32, Victoria Street, S.W.1. An invitation to hold the 1933 conference at Margate was accepted.

Notes

The Generation of Electricity During August

The official returns rendered to the Electricity Commissioners show that 815 million kWh of electricity was generated by authorised undertakers in Great Britain during August, as compared with the revised figure of 759 million kWh in the corresponding month of 1931—an increase of 7.4 per cent.

During the first eight months of 1932, up to the end of August, the total amount of electricity generated by authorised undertakers was 7,710 million kWh, as compared with the revised figure of 7,183 million kWh for the corresponding period of 1931, representing an increase of 527 million kWh or 7.3 per cent.

The E.P.E.A. Dinner

The fourteenth annual dinner given by the Southern Division to the members of the National Executive Council will be held at the Holborn Restaurant, W.C.1, on Saturday, October 1st, at 6 p.m. The dinner will, as last year, be followed by dancing. Tickets for members at 8s. 6d. and non-members at 10s. 6d. may be obtained from technical representatives or from the hon. secretary, Mr. F. H. Smethurst, "Tremorvah," Lynton Road South, Gravesend, Kent.

A New Road-up Signal

The new traffic obstruction signal illustrated herewith is for use where road repairs necessitate the institution of one-way traffic. It has been patented by Mr. G. A. H. Wootton, chief engineer at Scotland Yard, and is now receiving finishing touches at the Ediswan Co.'s Ponders End works.

The signals will be employed in pairs, one at each end of an obstruction, and they consist of electrically operated discs mounted on wheels. They will be controlled by an operator at a suitable observation point by a switch which is so constructed that while both signals may be placed at "Stop" it is impossible to set them both at "All Clear." At night the discs are illuminated and a red or green light appears in a lens at the top of the fitting. A bell is also provided for giving audible warnings.

The signals have been approved by the Ministry of Transport and are being made by the Edison Swan Electric Co., Ltd. A specimen signal was exhibited by the company at the Public Lighting Engineers' Conference at Blackpool recently.

The new road obstruction signal

Police Radio in New York

A new radio transmitter has recently been installed at the police headquarters in New York. It is similar in design to the apparatus developed for broadcasting purposes. The equipment is being supplemented by two additional 400-watt radio transmitters, one to be situated in the Bronx and the other in Brooklyn. These stations will form a radio transmitting station network covering Greater New York. The network will be controlled from Headquarters and police alarms will be broadcast to all stations from this point. This control is made possible by a novel speech input equipment which has been installed adjacent to the transmitting equipment at Center Street. A switch is provided on the control panel whereby the police commissioner or chief inspector may personally dispatch orders through microphones in their offices.

Dispatching of instructions will take place from a newly fitted out operating room which is adjacent to the headquarters telephone switchboard. Incoming calls are sent to a dispatcher in the operating room who has before him on a large table detailed maps showing the police precincts in all the boroughs. Small numbered discs represent the cruising police cars and these are arranged on the maps before the dispatcher. A picture of the equipment appears on p. 401.

Classes for Liverpool Apprentices

As a result of conferences between bodies interested in the electrical industry a scheme of part-time day and evening classes for apprentices and learners in the electrical trades has been arranged by the Liverpool Education Committee in co-operation with the Electrical Contractors' Association, the City Electrical Engineers' Department and the Electrical Trades Union. These bodies are now directly represented on an Advisory Committee which will visit the classes and advise the managers of the Technical School on matters concerning the development and progress of the new venture. The Advisory Committee decided to adopt the new scheme of training in electrical installation work as prepared by the Advisory Committee of the Electrical Contractors' Association on which the Institution of Electrical Engineers and the Electrical Trades Union are represented. This scheme has been adopted by the City and Guilds of London Institute for the official examinations to be conducted by that body on a national basis. Members of the Electrical Trades Advisory Committee include Mr. R. Harrison Watson (chairman), and Mr. A. E. Chesters (Liverpool Section, Electrical Contractors' Association); Mr. P. J. Robinson and Mr. L. Breach (Corporation Electric Supply Department); Mr. J. Illingworth and Councillor G. Chadwick (Liverpool Branch, Electrical Trades Union).

The Women's Engineering Society

An air meeting has been arranged by the Women's Engineering Society, to be held on September 18th at Stoneham Park, Southampton, during the annual conference of the Society. The programme will include a parade of various types of aircraft and formation flying. Particulars of the meeting and of the conference can be obtained from Miss C. Haslett, hon. secretary, 46, Kensington Court, W.8

Appointments Vacant

Showroom superintendent, consumers' engineer, receptionist and cooking demonstrator, for Ealing Electricity Department.

Switchroom engineer for Croydon Electricity Department.

Chief clerk for Doncaster Electricity Department.

(See our advertisement pages to-day.)

Electricity in a Birmingham Bank

A number of interesting features are included in the electrical equipment to be installed at the new premises for the Birmingham Municipal Bank. This work will be begun in a few weeks' time, the contract for the electrical work having been placed with Mr. Thomas Glover, Birmingham.

Among the equipment to be installed will be electric clocks, telephones and dictaphones, and elaborate systems of electric bells and alarm clocks. At night there will be neon lighting on three sides of the building. Power and lighting will be controlled from a main switchboard in the basement, which will be connected to twenty-six smaller boards situated in various parts of the premises. Power plugs will be installed for adding machines and there will be two electric passenger lifts, circulating pumps and motors for a suction tube system.

A special feaure of the lighting installation will be the cornice lighting in the general manager's room, the committee room, and the safe deposit. Concealed lighting, indeed, will be almost universally employed. The banking hall, leading from Broad Street, will be illuminated by means of 120 lamps, each of 100 watts, concealed above fifteen glass ceiling panels. Floodlighting will be carried out at the front of the building by means of forty-five 200-W lamps fitted behind pillars in the ceiling of an imposing loggia. The internal lighting arrangements will include an auxiliary lighting system, worked from batteries and designed to come into automatic operation in the case of any major failure. Each of the main administrative rooms will have, in addition to the local switching, a master switch outside the door and a small pilot light to show whether the lights within the room are still burning. Illuminated signs are to be fitted to certain of the public offices. The wiring will be run in galvanised conduit.

Why Chesterfield Uses Gas

Mr. D. H. Davies, the borough electrical engineer of Chesterfield, has written us with regard to a statement made at the recent conference of the Association of Public Lighting Engineers that there are only 32 electric lamps in Chesterfield as compared with 1,673 gas lamps. He says that the main reason for this is that by the provision of the Gas Acts the Gas Department is prohibited from contributing directly to rate relief; as an alternative a very low rate (2d. per therm) is charged for the gas used for public lighting.

Incidentally Mr. Davies says that he has been described in the Press (but not in the ELECTRICAL REVIEW) as the President of the A.P.L.E., whereas, in fact, he does not belong to that Association.

Educational

Particulars are given in our advertisement pages to-day of electrical engineering classes which will commence shortly at the Battersea Polytechnic, the Poplar School of Engineering and Navigation, the South-East London Technical Institute, the Hackney Technical Institute, and the Paddington Technical Institute.

A course of lectures on "Television," illustrated by experiments and demonstrations, will be given on Thursdays (8-9.30 p.m.), commencing October 16th, in the Electrical Engineering Department of the Borough Polytechnic, Borough Road, S.E., by Mr. J. J. Denton, A.M.I.E.E., hon. secretary of the Television Society. Forms of application may be obtained from the Principal, Mr. J. W. Bispham.

Classes will also be held at the Borough Polytechnic, commencing on September 26th, in connection with the synthetic resin and moulding trade. Enrolment nights are September 19th, 21st and 23rd, and further particulars can be obtained from Mr. E. C. Pickering, Chemistry Department.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. D. J. McClelland, consulting engineer, of Melbourne, has been appointed a member of the Victorian Electricity Commission. Mr. McClelland is chairman of Armstrong Whitworth, Pty., Ltd., and other companies in Australia. He was responsible for carrying out the civil engineering works of the Rubicon hydro-electric (Sugarloaf) power stations of the Electricity Commission, also the hydro-electric works at the Shannon River, Tasmania, and the Clarence River, N.S.W. He collaborated with the late Sir John Monash in constructional engineering works now being erected by the Commission. The appointment to the Commission is only part time and the remuneration is £250 a year.

Mr. R. Illingworth, deputy city electrical engineer at Plymouth for the past three years, left there on September 9th to take up his new post of assistant general manager and deputy engineer in the electricity undertaking of the Poplar Borough Council. Before leaving Plymouth the staff of the Electricity Department presented him with a bookcase and china cupboard, each suitably inscribed, while the business men of the city gave him a gold watch as a parting gift. Mr. Illingworth was mainly responsible for the electrical transformation of Plymouth Hoe into a nightly fairyland, and for the inauguration of floodlighting at the bathing places and beaches, which has proved a successful innovation.

Mr. Robert Kidston, Stenhousemuir, has been awarded the first prize offered by the Royal Technical College (Mining Engineering Section) for the 1931-32 session for his paper on "The Reconditioning of Electrical Machinery." Mr. Kidston is assistant electrical engineer to Carron Company.

Mr. George R. Sankey, a director of Messrs. Joseph Sankey and Sons, Ltd., was married to Miss Margaret E. Thompson at Claverley Church on September 7th. Miss Thompson is the only daughter of Mr. James Thompson, a governing director of Messrs. John Thompson (Wolverhampton), Ltd., and associated companies. Among the presents was one from the employés of Messrs. Joseph Sankey and Sons.

Mr. G. O. Smith, Aberdeen, who is clerk of works for the Lerwick electric lighting scheme, has been appointed by the Town Council as chief engineer and manager of the scheme. The work of laying the cables is now finished, and the connections are being made to the shops, office buildings, and private houses.

Dr. Harold Moore, C.B.E., who has for many years been Director of Metallurgical Research at the Research Department, Woolwich, has been appointed, as from October 1st, Director of the British Non-Ferrous Metals Research Association, to succeed **Dr. R. S. Hutton,** who has been elected to the new Goldsmiths Professorship of Metallurgy at Cambridge University.

Sir M. J. Wilson has been elected a director of the London Electric Supply Corporation, Ltd.

Mr. T. A. Orford, son of Mr. and Mrs. T. Orford, Cleveleys, was married to Miss Dora Colles at Bispham Parish Church on September 10th. Mr. Orford is employed in the Electricity Department of Bispham Council.

Mr. George Shapiro, A.M.I.E.E., A.I.Lg., who contributes an article on the Dnieprostroi scheme to this issue, was born in Ackerman, Russia, in 1889. He graduated in the Faculty of Mathematics at the University of Odessa, and at the Institut Electrotechnique Montefiore, Liège. He came to England in 1914 and for many years was engaged in the electrical manufacturing industry with the British-Thomson-Houston Co., Ltd., Ferranti, Ltd., the Park Royal Engineering Works, and others. During the last few years he has been connected with the supply of British equipment for the electrical power stations which are being built in Russia, and at present he is practising as a consulting engineer. He has been an associate member of the Institution of Electrical Engineers since 1917.

[Navana, Ltd.
Mr. G. Shapiro, A.M.I.E.E.

Mr. H. O. Bishop, former manager of the Manchester office of the Hotpoint Electric Appliance Co., Ltd., has now taken up a position with the Electrical Department of the Falkirk Iron Co., Ltd., at 4, Cathedral Gates, Manchester, where he is opening an office and showrooms; he will be responsible for the company's business in Lancashire, Yorkshire, Cheshire, and North Wales. **Mr. Kennedy,** a former representative of the Hotpoint Co., has joined him.

Alderman W. Walker, a member of the Central Electricity Board, has been invited by the Manchester Corporation to be the next Lord Mayor of the City. He has been a member of the City Council since 1909, and has for a number of years served on the Electricity Committee, of which he is now chairman.

Mr. E. F. Hetherington, whose portrait accompanies this note, is the chief engineer and manager to the West Midlands Joint Electricity Authority. In this capacity he was responsible for the design and construction of the new Ironbridge station which we described in our issue of September 2nd. The station is to be officially opened next month.

[H. J. Whitlock & Sons, Ltd.
Mr. E. F. Hetherington, M.I.E.E.

Mr. Hetherington served with the North Metropolitan Electric Power Supply Co. for a period of twenty years and left this company in 1927 to become senior assistant to Mr. C. T. Allen, who was then chief engineer to the West Midlands Joint Electricity Authority. When Mr. Allen was appointed to take charge of the Central England area of the Central Electricity Board, in 1928, Mr. Hetherington succeeded him. He is a member of the Institutions of Electrical and Mechanical Engineers.

There was a plea for a fair deal for **Mr. C. Furness,** borough electrical engineer, at a meeting of Blackpool Town Council on September 7th, by Ald. John Potter, M.P., when a proposal to separate the transport and electrical undertakings was supported, the services of Mr. Furness to be retained at a salary of £1,600 a year. A transport manager is being advertised for at a salary of £1,000. Ald. J. Tomlinson contended that Mr. W. M. Campbell, traffic superintendent, could take over the reorganisation of the department without a transport manager being appointed. Mr. J. R. Quayle urged it was wrong to separate the departments. Mr. Furness had only two or three years to serve before retirement, and they ought to leave things as they were. He had done excellent work, but it would not be businesslike to pay him £1,600 a year for one job when he had been paid a similar amount for the dual position. Alderman Potter said it was impossible for Mr. Furness to carry on both positions with such tremendous work and responsibility. Mr. Furness came to Blackpool as electrical engineer 31 years ago at a salary of £520 per annum. The output was then small, but now it was 44,000,000 kWh, and it was a whole-time job for one man.

Sir Andrew Duncan, chairman of the Central Electricity Board, and **Sir Archibald Page,** chief engineer, visited the new Building Centre on September 8th. The visitors were shown round by Mr. H. T. Young, chairman of the E.D.A. Building Centre, Electrical Section Main Committee, which has been responsible for the organisaton of the whole of the electrical exhibits. **Mr. T. P. Wilmshurst,** one of the Electricity Commissioners, also visited the Centre during the afternoon.

Mr. M. M. McQueen, chief of the Radio Department of the General Electric Co., Ltd., sailed for the United States on September 10th, where he is to make a survey of the radio industry in that country for his company.

The marriage took place at St. Nicholas' Church, Portslade, on September 3rd, of **Mr. John Bunyan, B.Sc.,** a member of the Electrical Control Department of Allen West & Co., Ltd., electrical engineers, Brighton, and Miss Kathleen Ruth Baker, daughter of Mr. Herbert Baker, of Portslade-by-Sea.

Mr. Alan M. Spruce, the author of the article on "Metal-clad Switchgear" which appeared in our last issue was inadvertently described as an "A.M.I.E.E." in the title. Actually he is an associate of the *American* Institute of Electrical Engineers.

Mr. M. C. Toner, Eastern representative of Holophane, Ltd., has removed to 37, Stonegate Farm Road, Leeds.

Obituary

Mr. E. Vesey.—The death is announced, at the age of 60 years, of Mr. Edward Vesey, J.P., who had been on the staff of the Altrincham Electric Supply Co. since 1899. He served for a long period on the Urban Council, had been a county magistrate since 1925, and was the first chairman of the Altrincham Court of Referees.

Will.—Mr. J. Anderson, of Monaco, late of the Eastern Telegraph Co., Athens, left estate in England of £10,862.

Mr. Thomas Jacob, managing director of Jacob, White & Co., Ltd., left £9,373 (net personalty £7,756).

New Books

Technical Data on Fuel. Third edition. Edited by H. M. SPIERS, M.A., B.Sc., F.I.C. Pp. xv., 302; illustrated. London: The British National Committee of the World Power Conference. Price 12s. 6d. net.

The first edition of this handbook was prepared as a British contribution to the World Fuel Conference held in London in 1928, and it has proved so popular that a third edition has already been required. The data have been revised where necessary. The contents of the present edition are about 75 per cent greater than those of the first edition, but owing to the use of a thinner paper the size of the book has not been increased. With the exception of some of the tables, all the data and articles are printed on the right hand pages, which alone are numbered, the other pages being left blank so that the owner of the book may add his own notes.

Generally speaking, information which is readily available in various text-books is not included. The aim has been rather to bring together data which could only otherwise be obtained by reference to a large number of different books and technical papers. In addition to the tables and diagrams there is a number of special articles written by experts, and several manufacturing firms have provided data which they have evolved as the result of their experience and investigations. The book is of use not only to fuel technologists but to engineers and physicists generally, and especially to those dealing with heat in some form. Of special interest to power station engineers will be the skeleton steam tables proposed by the International Steam Table Conference, 1930, dealing with pressures up to 3,500 lb. per sq. in., and information on the creep stress of various metals and alloys at high temperatures.

Most of the tables are given in C.G.S. units but some of those dealing with steam and refrigerants are in British units. Adequate tables of conversion factors are given, and in most cases the appropriate factors are given in convenient form adjacent to the various tables.

The Exponential and Hyperbolic Functions. By A. H. BELL. Pp. x+81; figs. London: Sir Isaac Pitman & Sons. Price 3s. 6d.

In this little book the author deals with the elementary theory of the exponential, hyperbolic, and circular functions, together with their application to simple problems in engineering and physics. The exponential function is defined by its characteristic differential property. The hyperbolic functions are first presented as particular forms of the exponential function; later, the author demonstrates the connections of these functions with the hyperbola, but he here appears to have obscured the characteristic analogies of the hyperbolic with the circular functions, by not definitely referring the former to a rectangular hyperbola. The expansional values of the circular functions are obtained by Maclaurin's method, while in a succeeding chapter the ordinary geometrical interpretation of the complex quantity is dealt with. The work concludes with a useful collection of formulæ. There is a good selection of problems for solution, and the answers to these appear at the end of the book.

In the preface, the author states that he has been more concerned to present applications of elementary theory than intricate niceties. In limiting himself in this way he has sacrificed his opportunity to present an interesting work, and the general treatment is necessarily commonplace. Indeed, as a knowledge of the elements of the calculus is expected of the reader, those who are in a position to go through the book will not find very much that is new. It is rather surprising to find no reference to the gudermannian function in a work on hyperbolic functions, even though the author has stressed the practical to the exclusion of the academic.

The general reader of mathematical tastes will find little to interest him in this book. To students of engineering who desire to develop their mathematical technique the work will be found very useful.

Testing Radio Sets. By J. H. REYNER. Pp. 207; figs. 95. London: Chapman and Hall. Price 10s. 6d.

The first edition of this useful book was reviewed on January 30th, 1931. Since that time the advances in radio development have necessitated the bringing out of a new edition. The first section on "Fault Testing" in invaluable to the radio enthusiast, as it deals clearly and methodically with almost all common faults, and these tests may all be undertaken by the average wireless set user. In this section the chapters dealing with superheterodyne receivers and mains apparatus have been enlarged.

The second section, headed "Laboratory Tests," has been very considerably revised and enlarged, although it probably has not such a wide appeal as the first section. The appendix has been rewritten in the form of a chapter on component testing.

* * *

Shorter Notices

"Wireless and Shipping." Pp. 87; illus. London: "The Shipping World." Price 2s.—This handy book deals principally with wireless in relation to shipping, and records Marconi's early experiments. The progress and application of wireless in connection with the Mercantile Marine is reviewed by writers who have either been associated with Marconi in his work for many years, or with activities which have been influenced by his inventions, and Marchese Marconi himself contributes a historical article in connection with wireless at sea. The book is definitely non-technical in character.

"The Engineer's Year Book," 1932. 39th Edition. Pp. 3,000; 3,000 illustrations. London: Morgan Bros., Ltd. Price 31s. 6d.—In addition to the general revision of the work, each section has been thoroughly revised. New data and tables have been included and the old matter rearranged. Special attention has been given to electrical engineering and traction and refrigeration. The appendix includes glossaries and technical terms in French, Italian, Spanish and Russian.

"Induction Coil Theory and Applications," by E. T. Jones. Pp. 244; figs. 131. Price 12s. 6d.; and "Internal Combustion Locomotives and Motor Coaches," by Prof. I. Franco and P. Labryn. Price 12s. 6d. London: Sir Isaac Pitman and Sons.

"Improved Cathode-ray Oscillograph." Pp. 32; 13 figs. and diagrams. London: Standard Telephones & Cables, Ltd.—This informative booklet should help research, educational, and industrial users to make the most of the possibilities of this inertia-free instrument.

"Sherardizing," by G. Petrie and J. C. Mills. Pp. 58; figs. 5. Price 2s. This book has been written with the object of explaining as clearly as possible the history, operation and application of the sherardizing process.

We have received a copy of the first number (August) of the *Practical Electrical Engineer*, a monthly journal (1s.) published by Messrs. George Newnes, Ltd.

"Cooper's Ohm's Law Charts." London: Oxford University Press. Price 6d.

"Lichtbogen-Stromrichter," by Dr. Ing. E. Marx. Pp. 167; figs. 103. Berlin: Julius Springer. Price Rm. 17.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Pioneer Private Telephone Co., Ltd.—Private company. Registered September 8th. Capital, £1,500 in £1 shares. Objects: To acquire the business carried on by A. Grime and N. Grime as the "Pioneer Private Telephone Co.," to carry on the business of financing and installing synchronised time, signalling and automatic or other telephone systems; to manufacture and deal in telephone equipment, electrical apparatus, &c. The directors are: A. Grime and N. Grime, both of "Linden," Goulden Road, Withington, Manchester, and N. Preston, Chester Road, Poynton, Ches. Registered office: 9, Albert Square, Manchester.

A. N. Anderson & Co., Ltd.—Private company. Registered September 6th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical and mechanical supplies and parts, &c. The directors are: A. N. Anderson, 8, Park Mount, Kirkstall, Leeds, and T. Moxon, 13, Ascot Terrace, East Park Drive, Leeds. Solicitors: Granger and Neild, 10, Bank Street, Leeds.

Eltons Radio, Ltd.—Private company. Registered September 5th. Capital, £750 in £1 shares. Objects: To acquire a radio business at 29, Lower Temple Street, Birmingham, and to carry on the business of letters on hire or sale or any system of hire-purchase of all kinds of wireless apparatus and appliances, &c. The permanent directors are: H. Elliott, 29, Benton Road, Birmingham; F. G. Arthurton, 134, Northgate Street, Great Yarmouth; and P. S. B. Webb, 12, Whalley Road, Whalley Range, Manchester. Registered office: 2, Edgbaston Street, Birmingham.

William Brook & Sons, Engineers, Ltd.—Private company. Registered in Edinburgh on Sept. 6th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, lighting, power, heating and ventilating engineers, &c. The directors are: M. Brook and B. Brook, both of 21, West Princes Street, Glasgow. Registered office: 35, Rosehall Street, Glasgow, C.4.

R. J. Raphael & Co., Ltd.—Private company. Registered September 7th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and wholesale and retail dealers in electrical and mechanical appliances, wireless, telephone and telegraph apparatus, &c. The directors are: R. J. Raphael and Mrs. Annie Raphael, 29, Elmdale Road, Palmers Green, N.13. Registered office: 305, King's Road, Chelsea.

A. J. Shrosbery & Co., Ltd.—Private company. Registered September 8th. Capital, £1,000 in £1 shares. Objects: To acquire the business now carried on at Colchester as "Shrosbery Bakewell & Co., Ltd.," and to carry on the business of electrical engineers and contractors, suppliers of electricity, &c. The directors are: A. J. Shrosbery (chairman), and H. E.

Shrosbery, both of 7, Abbeygate Street, Colchester. Solicitors: Jones & Son, Town Hall Chambers, Colchester.

Electrical Contractors (Sileby), Ltd.—Private company. Registered September 9th. Capital £250 in £1 shares. Objects: To carry on the business of electrical contractors, engineers and manufacturers, &c. The directors are: H. J. Page, High Street, Sileby, Leics; and Miss M. B. Robbins, 124, Seagrave Road, Sileby. Registered office: High Street, Sileby.

Butler's Radio, Ltd.—Private company. Registered September 10th. Capital £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio apparatus, electrical, radio and mechanical engineers, &c. The directors are: A. Le Boutillier, 219, Forest Road, Walthamstow, E.17, and P. H. Turner, 91, Chelmsford Road, South Woodford, E.18. Registered office: 191, Forest Road, Walthamstow, E.17.

Returns of Electrical Companies

Isle of Thanet Electric Supply Co., Ltd.—Capital, £500,000 in 282,000 6 per cent. preference, 150,000 ordinary, and 68,000 unissued shares of £1 each. Return dated April 4th, 1932. All the preference and ordinary shares taken up. £222,000 paid on 222,000 preference shares, £210,000 considered as paid on 60,000 preference and 150,000 ordinary shares. Mortgages and charges: £272,600.

Crossley Bros., Ltd.—Capital, £1,492,293 in 403,390 preference shares of £1, 1,015,414 ordinary shares of 10s., and 581,196 unissued shares of £1. Return dated March 8th, 1932. All the preference and ordinary shares taken up. £405,700 paid on 278,200 preference and 255,000 ordinary shares, £505,397 considered as paid on 125,190 preference and 760,414 ordinary shares. Mortgages and charges, nil.

Edward Wilcox & Co., Ltd.—Return dated July 6th, 1932. Capital £2,000 in 1,000 preference and 1,000 ordinary shares of £1 each. 600 preference and 1,000 ordinary shares taken up. £1,163 7s. 6d. paid in cash, being £1 per share on 600 preference and 501 ordinary, and 2s. 6d. per share on 499 ordinary shares. Mortgages and charges, nil.

W. J. Butler & Co., Ltd.—Mortgage debenture dated August 20th, 1932, to secure £100, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: M. Warren, Stanmore, Caldecote Street, Newport Pagnell, Bucks.

Ray Engineering Co., Ltd.—Particulars filed of £500 debentures authorised August 24th, 1932, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

River Plate Electricity Co., Ltd.—Capital £625,000 in £150,000 preference stock, and £475,000 ordinary stock. Return dated April 25th, 1932. All stock taken up. £112,447 paid on £50,000 preference and £62,447 ordinary stock. £512,553 considered as paid on the remainder. Mortgages and charges, nil.

Jarrow & District Electric Traction Co., Ltd.—Capital £60,000 in £1 shares. Return dated May 11th, 1932. 59,934 shares taken up. £49,945 paid. £9,989 considered as paid. Mortgages and charges, nil.

Park Royal Engineering Co., Ltd.—Capital £50,000 in £1 shares. Return dated April 1st, 1932. 37,605 shares taken up. £36,605 paid. £1,000 considered as paid. Mortgages and charges, £12,000.

City of Buenos Ayres Tramways Co. (1904), Ltd.—Capital, £1,240,000 in £5 shares. Return dated February 29th, 1932. All shares taken up. £1,240,000 considered as paid. Mortgages and charges: £144,652.

A. J. Bennett & Co., Ltd.—H. W. Ballard, 16, Eastcheap, E.C.3, was appointed receiver on September 2nd, under powers contained in debenture dated July 31st, 1930.

Wanstead Electric, Ltd.—Capital, £500 in £1 shares. Return dated March 18th, 1932. All shares taken up. £500 paid. Mortgages and charges, nil.

Sloan Electrical Co., Ltd.—Issue on Sept. 1st of £6,000 debentures, part of a series already registered.

City Notes

Ferranti, Ltd., report a net profit for the year ended June 30th last, after making provision for general establishment charges, bad debts, repairs and renewals, &c., of £54,904, as compared with £60,689 in the preceding year, to which is added £35,980 brought in, making £90,884. After deducting the preference dividend and expenses in respect of the issue of additional preference capital, it is proposed to maintain the ordinary dividend at 6 per cent., less tax, leaving £41,545 to be carried forward. The report states that to provide additional capital 103,834 seven per cent. cumulative preference shares of £1 each were issued (at par) during the year. Considerable extensions to plant have been made and buildings have been added to during the year. Meeting: September 16th.

Insull Utilities Investments, Inc.—According to the New York correspondent of *The Times*, the receivers for Insull Utility Investments, Inc., an investment trust formed in the days of the stock market "boom" by Mr. Samuel Insull, have reported to the Federal District Court in Chicago that there was a deficit in its accounts of $226,510,976. The auditors for the receivers said they had found "inconsistency in the accounting records of the company," and added that if the records had been consistently kept the investment trust's operations in the securities of the Insull public utility companies would have shown losses throughout the whole period of its existence. At one time in 1929 the stock of Insull Utility Investments, Inc., stood as high as $149 a share. There are still outstanding 4,240,897 shares.

The A.E.G.—The Berlin correspondent of the *Financial Times* reports that on September 12th the shares of the Allgemeine Elektrizitäts-Gesellschaft dropped 5 points to 36. On September 10th a Berlin newspaper statement that the company would have to write off three-fourths of its share capital was denied by the company, but the opportunity to make a reassuring statement about the position was not taken. It is believed that two-thirds of the share capital will be written off eventually. The decision as to the amount of capital reduction written off is expected to be arrived at in November or December next.

Companies to be Struck off the Register.—The names of the undermentioned companies will be struck off the Register at the expiration of three months, unless cause is shown to the contrary:—

Emerald Radio Co., Ltd.
L.M.S. Electrical Co., Ltd.
South Lancashire Electric Supply Co., Ltd.
Wireless Control Syndicate, Ltd.
Wireless Lights, Ltd.

The Compania de Electricidad de la Provincia de Buenos Aires reports gross receipts for 1931 of £368,024, as compared with £306,143 in 1930. Expenses, including £40,893 for depreciation, totalled £295,117 (£229,964), leaving net earnings of £72,907 (against £76,178), and after adding other miscellaneous income, the net profit was £75,294 (£74,884). The preference dividends absorb £70,097, and the balance of £5,196 is placed to reserve. The sales of electricity totalled 17,258,227 kWh (against 16,404,762 kWh in 1930).

The Zurich Bank for Electrical Undertakings.—After writing off securities for 2,141,000 fr., the Bank für Elektrische Unternehmungen, of Zurich, reports net profits of 8,277,000 for 1931-32 as against 9,928,000 fr. in the previous year. The dividend is at the rate of 8 per cent., as compared with 10 per cent. and 12 per cent. in the two previous years respectively.

Imperial Chemical Industries, Ltd., has announced an interim dividend of 2½ per cent. on the ordinary capital (1½ per cent. last year), less tax at 4s. 9½d. in the £, being United Kingdom income tax at 5s. in the £, less dominion income tax relief at 2½d. in the £.

Kreuger & Toll.—The Stockholm correspondent of *The Times* reports that among the chief creditors of this company are the International Telegraph and Telephone Corporation for 60,500,000kr. against security of 410,000 "A" shares in the Ericsson Company. The Skandinaviska Bank is a creditor for nearly 39,000,000kr. and the Ericsson Telephone Co. for 30,000,000kr.

The Madras Electric Tramways (1904), Ltd., has declared an interim dividend of 2½ per cent. on the ordinary shares, tax free. No interim dividend was paid last year, but the dividend for the year was 5 per cent., tax free.

The Ascot District Gas & Electricity Co. has announced interim dividends at the rate of 10 per cent. per annum on the original "A" shares, and at 7 per cent. per annum on the additional "B" shares, less tax (same).

The Hendon Electric Supply Co., Ltd., announces the payment of an interim dividend of 1s. per share on the ordinary shares (against 10.85d.).

Ward & Goldstone, Ltd., have declared the usual interim dividend for the half-year on the cumulative preference shares at the rate of 7 per cent. per annum.

The Electric Supply Corporation, Ltd., has declared an interim ordinary dividend of 4 per cent., less tax (same).

Stocks and Shares

TUESDAY EVENING.

THE revival in Stock Exchange business to which reference has been made here during the past few weeks, became abruptly checked by a concatenation of adverse circumstances which led to heavy falls in most of the speculative departments. The political developments in Germany, combined with sharp falls in metals and commodities, served to emphasise the weakness shown by the New York Stock Exchange, and to shake severely the confidence which buyers on this side of the Atlantic had begun to show in their Stock Exchange operations. The gilt-edged markets were little affected by a weakness that spread throughout the other parts of the House. Nor were the shares in the electricity supply market shaken to any noticeable extent. In fact, the latter list is one of the steadiest in the Stock Exchange. Severe falls have taken place in American utilities. Prices for tin, copper and rubber exhibit sharp declines since a week ago.

The Gilt-edged Stocks

The 4½ per cent. debenture stocks of the electricity boards—Central and London and Home Counties—are unchanged at 102½ and 106½ respectively. The reason for the Central Electricity stock standing below that of the London and Home Counties is that a new issue is expected to be made soon after the lifting of the ban which has been placed by the Government upon fresh capital borrowing. It is true that the last issue of Central Electricity scrip has not yet become fully paid, and, in itself, this would suggest a deferring for some time of any fresh borrowing on behalf of the Central Electricity Board. Nevertheless, the impression prevails that the latter will take advantage at some early date of the easy rates now current in the money market. The latest-issued scrip, the price of which fell to 4 premium, recovered to 6¾ premium before reverting to 5¾.

Tube Railway Prior-charge Stocks

Of home railway prior-charge stock in the Underground group, there is comparatively little on offer, but of the trustee securities a few thousand pounds can be obtained of Metropolitan 3½ per cent. "A" preference, and the same company's 3½ per cent. convertible preference, at 74 and 73¾ respectively. The average yield is £4 14s. 9d. per cent. The dividend payments are due in February and August. Fair-sized lines of London Electric debenture, Central London debenture, and

District Power House debenture, have been lifted from the market during the past few days. There is at the moment on offer £1,000 each of the 4½ per cent. second debenture stocks of the City and South London and the London Electric Railways. For these stocks, the high price of 107 is asked, the yield being no more than 3¾ per cent. on the money. The stocks are guaranteed as to principal and interest by the Government, and the dividends are due on the 1st of January and July.

The Threatened Strike

Underground Electric ordinary shares are unchanged at 17s. 6d. Caution is shown in dealing in the Undergrounds, owing to the possibility that existed at the beginning of this week of a strike of busmen, which strike, if it developed, might spread to the Underground system as a whole. Metropolitan consolidated ordinary stock rose to 64, and reacted to 62, leaving a gain of 2 points. Districts also are 2 points up at 61½. London and Suburban preference shares retain their improvement at 10s.

Dollar Shares

Financial matters in the United States are in a condition well summed up in the statement that the optimists are bullish, but scared. The rises have been so considerable as to induce a certain amount of inquiry as to whether they have not gone far enough. Consolidated Gas and Electric of Baltimore shares, for instance, which rose 35 points in a couple of weeks, although they hold their quotation, have halted in their stride, and American Telephone and Telegraphs at 162⅛ shed 10 points of their recent vigorous advance. International Telephone and Telegraph, after being up to 21, fell back to 16½. Hydro-Electrics rose to 13 before going back to 10¾. International holdings, which a few weeks ago were standing at ⅞, and since then have been up to 2⅝, are back to 1½. British Columbia Power "A" fell sharply to 32, the "B" to 8. Shawinigans at 24½ are 3 points down, Power Corporation of Canada dropped to 20, Montreal Light and Power to 48.

Brazilian Tractions, which were 14¾ last week, have been up to 17½, from which the price gave way to 15. The company's 6 per cent. preference shares are still quoted at 90. The last recorded bargain in them is at 80, marked in the *Stock Exchange Official List* on February 3rd this year. Mexican utilities are substantially higher. The Tramways Company's 5 per cent. bonds at 67½ have put on 13 points.

Cables and Wireless

Cables and Wireless stocks have ranked of late amongst the popular purchases in the Stock Exchange, upon circulation of reports to the effect that the combine is securing greatly improved traffics. A bull account became built up in the stocks, however, and this serves as a drag on exuberance. The 5½ per cent. preference is 2 lower at 70½, and both the ordinary stocks gave way. Oriental Telephones continue to be supported, and are again 2s. 6d. up at 2¾. No further changes have occurred in Globe Telegraphs. Anglo-American stocks hold the gains they recently acquired.

Home Electricity Supply Shares

The Electric Supply Corporation has declared the same interim dividend as that of last year, namely, 4 per cent. actual. The company has been paying 11 per cent. on the ordinary shares for some years past, and it is presumed that this will be continued in respect of 1932. One of the companies in which the Electric Supply Corporation has a considerable interest is the Hendon Electric Company, and the latter has increased its dividend to 1s. per share free of tax, being an improvement of 1.15d. Chiswick Electric ordinary shares are a little better at 38s., at which price a thousand or two can be obtained. Kensington ordinary have reacted to 32s. 6d., and Westminsters to 31s. 6d. Metropolitans are 1/16 higher at 46s. 3d. In the Provincial group, the changes are confined to small gains, and amongst others that have benefited are the Midland Electric Power, Northampton and Yorkshire. Urban ordinary shares are 9d. better at 29s. 6d.

The Colonial group has a feature of strength in Victoria Falls ordinary, which are 2s. 6d. up at 71s. 3d.

Manufacturing and Other Shares

In the market for manufacturing and equipment shares, changes are comparatively few. The tendency throughout the group is steady, without there being any special movement. Enfields have strengthened to 4¼. General Electric ordinary fell back to 40s. 9d. in sympathy with the American slump. Brush ordinary changed hands at 25 on Monday in this week. Ever-Ready shares are 1s. better at 27s., Crompton Parkinson hardened to 20s., and British Aluminium are better at 27s. 6d. Johnson and Phillips at 21s. 3d. are 1/16 up. Electric and Musical Industries descended abruptly from 17s. 3d. to a florin lower.

The iron and steel market is inclined to be dull. Vickers going back to 7s. 1½d., Babcock and Wilcox keep about 46s. 3d. Rubber, after being a little over 3d. per lb., reacted to 2.9/16d., taking with it the prices of most of the shares which recently improved.

The tendency throughout the Stock Exchange turned weak by reason of heavy sales from America, coupled with disquieting political developments in Germany. Business has fallen away in most of the markets, and the recent optimism has given place to a sentiment considerably more subdued.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1930.	1931.	Price. Sept. 13.	Rise. or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	70/-	—	4 5 9
Brompton Ordinary	1	8½	8½	31/6	—	4 9 0
Central Electricity 4½% Deb.	Stock	4½	4½	102½	—	4 7 10
Charing Cross Ordinary	1	8½	8½	32/-	—	4 7 6
Chelsea	1	8½	8½	32/-xd.	—	4 7 6
City of London	1	10	10	41/3xd.	—	4 16 10
Clyde Valley	1	8	7	31/3	—	4 9 7
County of London	1	11	10½	47/6	—	4 8 5
Edmundsons' 7% Pref.	1	7	7	29/-	—	4 16 7
Elec. Dis. Yorkshire	1	9	9	39/6	+⅛	4 11 1
Elec. Supply Corporation	1	11	11	52/6	—	4 3 10
Kensington Ordinary	1	8	8	32/6	-6d.	4 6 2
Lancs. Light and Power	1	6½	7	28/9	—	4 17 5
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	—	4 4 6
London Electric	1	9	9	32/-	—	4 7 6
Metropolitan	1	10	10	46/3	+⅛	4 6 7
Midland Counties	1	7	7	32/6	—	4 6 2
Mid. Elec. Power	1	8	8	33/9	+6d.	4 14 9
Newcastle-on-Tyne Ordinary	1	6	6	26/3	+6d.	4 11 5
Do. 7% Pref.	1	7	7	31/-	—	4 10 4
Northampton	1	10	10	45/9	+9d.	4 7 4
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/-	—	4 5 9
St. James' and Pall Mall	1	8	8	31/-	—	4 10 4
Scottish Power	1	8	—	32/6	—	4 18 6
South London	1	8½	8½	33/-	—	4 10 0
Urban Ordinary	1	7	—	29/6	+9d.	4 15 0
Westminster Ordinary	1	8½	8½	31/6	-6d.	4 9 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	16/3	—	9 4 8
Yorkshire Elec.	1	8	8	38/9	+9d.	4 2 6

HOME RAILS.

Central London Ord. Assented	Stock	4	4	81½	—	4 18 2
Metropolitan	„	3½	2½	62	+2	4 0 8
Do. District	„	5	4½	61½	+2	7 6 3
Underground Electric	1	8	7	17/6	—	8 0 0

TELEGRAPH AND TELEPHONES.

American Tel. & Tel.	$100	9	9	162½	-10	5 10 9
Anglo-Am. Tel. Pref.	Stock	6	6	102½	—	5 17 1
Do. Def.	„	1½	1½	25½	—	5 17 8
Cables & Wireless 5½% Pref.	„	5½	2½	70½	-2	3 18 0
Do. A 7½% Ord.	„	—	Nil	22	-3	—
Do. B Ord.	„	—	Nil	12	-1	—
Globe Tel. and T. Ord.	10	8½	Nil	9	—	—
Do. do. Pref.	10	6	6	11	—	5 14 3
Great Northern Tel.	10	20	20	26	—	7 13 10
Marconi-Marine	1	15	10	30/-	—	6 13 4
Oriental Telephone Ord.	1	12	12	2½	+⅛	*4 7 5

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	—	—	5/-	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	„	5	5	300	—	—
Do. do. Pref. Ord.	„	8	8	133½	—	5 19 10
Brazil Traction	100	—	—	15	+½	—
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	99½	—	5 0 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	10/-	—	—
London United Tram Deb.	Stock	4	4	61½	—	6 10 0
Mexico Trams, 5% Bonds	—	5	5	30½	+3	16 8 0
Mexican Light Common	100	Nil	Nil	12½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	67½	+13	7 8 2
Victoria Falls Ord.	1	15	15	71/3	+⅛	4 4 3
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	—

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	4	18/9	—	4 5 4
Do. Pref.	1	8	8	30/-	-⅛	5 6 8
Babcock & Wilcox	1	15	14	46/3	—	6 1 9
British Aluminium Ord.	1	10	5	27/-	+9d.	3 16 4
British Insulated Ord.	1	15	15	65/-	—	4 12 4
Brush Ord.	Stock	5	Nil	32	—	—
Callender's	1	15	15	3	—	5 0 0
Do. 6½% Pref.	1	6½	6½	27/6	—	4 14 6
Crompton Parkinson Ord.	5/-	30	24	20/-	+⅛	6 0 0
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st. Pref.	1	7½	7½	23/3	—	6 9 4
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	4¼	+⅛	5 17 8
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/-	35	35	27/-	+1/-	6 9 7
Ferranti Pref.	1	7	7	23/9	—	5 18 0
G.E.C. Pref.	1	6½	6½	28/-	—	4 12 10
Do. ord.	1	10	8	40/9	-⅛	3 19 0
Henley's	1	30	30	5⅛	—	5 1 1
Do. 4½ Pref.	5	4½	4½	4½	—	4 12 4
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	1⅛	+⅛	4 14 1
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10½	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

5427. "Alternating-current generators." G. W. Walton. February 20th, 1931. (378923.)

7754. "Switch for the electric circuits of road vehicles." F. W. Bryan and C. G. Twigg. August 13th, 1931. (378980.)

10216. "Multiple electric fuseboxes." W. E. Evans. April 7th, 1931. (378850.)

10388. "Radio signalling systems." P. C. Ricchiardi. April 9th, 1930. (378925.)

11494. "Current-limiting devices." Siemens Electric Lamps & Supplies, Ltd., P. D. Oakley, and J. N. Aldington. April 17th, 1931. (378876.)

11495. "Electric current-limiting devices." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. April 17th, 1931. (378877.)

11692. "Electric selective relays." E. Whitby, I. A. D. Pedler, E. J. Selston, L. R. Lester, and J. Newman. April 20th, 1931. (378928.)

14165. "Electric insulators." Bullers, Ltd., and J. L. Langton. May 13th, 1931. (378882.)

14249. "Loud-speakers and like sound-reproducing apparatus." W. L. Colassi. May 14th, 1931. (378938.)

14297. "Electron-discharge devices." British Thomson-Houston Co., Ltd., May 29th, 1930. (378861.)

14474. "Cable and like telegraph and telephone transmission systems." Marconi's Wireless Telegraph Co., Ltd., and G. M. Wright. May 15th, 1931. (378862.)

14549. "Electric relays incorporating gasfilled tubes." Electrical Research Products, Inc. May 21st, 1930. (378868.)

14555. "Photo-electric web-registering device." W. W. Triggs (American Machine & Foundry Co.). May 16th, 1931. (378869.)

14575. "Dynamo-electric machines." Allgemeine Elektricitäts-Ges. May 17th, 1930. (378912.)

14791. "Dynamo-electric machines." British Thomson-Houston Co., Ltd., and H. W. Taylor. May 19th, 1931. (378920.)

14902. "Television and like apparatus." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett, L. E. Q. Walker and N. Levin. May 20th, 1931. (378948.)

14903. "Television apparatus." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett, and D. L. Plaistowe. May 20th, 1931. (378949.)

14904. "Low-frequency amplifiers." Marconi's Wireless Telegraph Co., Ltd., and P. K. Turner. May 20th, 1931. (378950.)

14942. "Electromechanical display devices." Associated Telephone and Telegraph Co. May 23rd, 1930. (378953.)

14961. "Electrical connections or couplings." Simplex Conduits, Ltd., and H. F. McLoughlin. May 21st, 1931. (378954.)

14980. "Control of electric motors driving multiple wire-drawing machines." W. Nacken. May 21st, 1931. (378955.)

14998. "Electrically operated horns." Lucas, Ltd., E. O. Turner and R. H. Purden. May 21st, 1931. (378957.)

15014. "Telegraph receivers." Creed & Co., Ltd. (Teletype Corporation). May 21st, 1931. (378958.)

15021. "Apparatus for charging storage batteries." Westinghouse Brake & Saxby Signal Co., Ltd. June 26th, 1930. (378959.)

15061. "Electrical condensers." Webb Condenser Co., Ltd., and E. Frewer. May 21st, 1931. (378960.)

15083. "Method of electrolytically depositing iron." E. Kelsen and F. Ausnit. May 21st, 1931. (378962.)

15206. "Light-sensitive detector or relay devices comprising sensitive means such as photo-electric or other cells." J. Stone & Co., Ltd., and J. F. B. Vidal. May 22nd, 1931. (378972.)

15219. "Electric motors." British Thomson-Houston Co., Ltd., and A. H. Maggs. May 22nd, 1931. (378975.)

15668. "Electric lampholders and the like." C. L. Cleburne. May 28th, 1931. (378991.)

15790. "Electric discharge devices." M-O Valve Co., Ltd., and A. E. McLeod. May 29th, 1931. (378994.)

15962/3. "Electric cables." General Cable Corporation. June 14th, 1930. (378996/7.)

15992. "Oscillation, generating and modulating arrangements suitable for use in wireless signalling." Marconi's Wireless Telegraph Co., Ltd. June 25th, 1930. (378998.)

16418. "Electric circuit-breakers and like protective devices." Siemens Bros. & Co., Ltd., and C. R. Riber. June 5th, 1931. (379008.)

16933. "Condensers, the coatings and the dielectric of which constitute at least one rectifier cell." Naamlooze Vennootschap Philips Gloeilampenfabrieken. July 24th, 1930. (379021.)

17244. "Tanks for containing electrical apparatus immersed in oil or other insulating liquids." A. G. Ellis, J. B. Hansell and Associated Electrical Industries, Ltd. June 13th, 1931. (379025.)

17672. "Electric hand irons." Warnell Patents, Ltd., H. K. Warner & G. R. Elliott. June 18th, 1931. (379030.)

18188. "Lead-in wires for incandescent lamps, radio tubes, and similar devices." American Brass Co. March 6th, 1931. (379034.)

18917. "Dynamo-electric machines." G. A. Juhlin and Associated Electrical Industries, Ltd. June 30th, 1931. (379039.)

19113. "Manually operated electric controllers of camshaft type." Allen West & Co., Ltd., and W. J. Paddock. July 2nd, 1931. (379041.)

19196. "Radio-gramophones." G. Forster. July 3rd, 1931. (379045.)

19557. "Apparatus for supplying electrical current to high-tension electrical discharge apparatus, particularly for use on motor vehicles." R. Macey. July 7th, 1931. (379048.)

20550. "Electric insulators." International General Electric Co., Inc. July 18th, 1930. (379056.)

21073. "Combined switches and wall connectors." A. P. Lundberg & Sons, Ltd., and G. Pegg. July 23rd, 1931. (Addition to 327021.) (379063.)

22092. "Electric condensers." International General Electric Co., Inc. August 4th, 1930. (379073.)

23545. "Thermionic valve holders." H. O. Meyer and A. Ashworth. August 22nd, 1931. (379090.)

24278. "Apparatus for the electrical reproduction of sound." British Thomson-Houston Co., Ltd., L. B. Ault and T. F. Robinson. August 28th, 1931. (Addition to 310284 and 373158.) (379100.)

24296. "Rotary electric switches of the secret contact-combination type." B. Putzel. August 28th, 1931. (379101.)

24530. "Electric circuit interrupters." Westinghouse Electric & Manufacturing Co. September 20th, 1930. (379105.)

25225. "Remote control installations." Siemens & Halske Akt.-Ges. October 30th, 1930. (379107.)

26010. "Electric power transformers." C. W. Galton. September 17th, 1931. (379113.)

26156. "Tuning devices for radio receivers and the like." R. B. Whittingham and Portadyne Radio, Ltd. September 18th, 1931. (379115.)

26740. "Electro-magnets suitable for use with direction-indicators." R. Bosch Akt.-Ges. October 23rd, 1930. (379117.)

27452. "Electro-hydraulic apparatus." British Thomson-Houston Co., Ltd. October 2nd, 1930. (379124.)

27653. "Electrical high-frequency oscillators." Marconi's Wireless Telegraph Co., Ltd. October 4th, 1930. (379126.)

29054. "Radio receivers, and control means therefor." Marconi's Wireless Telegraph Co., Ltd. October 17th, 1930. (379137.)

31380. "Controlling means for electrically driven vehicles." International General Electric Co., Inc. November 12th, 1930. (379148.)

31851. "Electrical musical instruments." L. Rouzet. November 17th, 1931. (379151.)

32710. "Searchlight reflector." M. Mannheimer. November 25th, 1931. (379159.)

33170. "Loud-speakers, microphones and other electro-acoustic devices." A. Carpmael (Siemens & Halske Akt.-Ges.). November 30th, 1931. (379167.)

33785. "Variable resistance units for use in connection with wireless receiving sets and like electrical apparatus." A. E. Watkins. December 5th, 1931. (378737.)

33935. "Mercury switches." Allgemeine Elektricitäts Ges. December 6th, 1930. (378738.)

34159. "Automatic multipolar toggle switch." W. Leyhausen. December 10th, 1930. (378741.)

34761. "Metallic-vapour rectifiers." Siemens-Schuckertwerke Akt.-Ges. February 5th, 1931. (378748.)

35094. "Apparatus for measuring electrical energy." O. Szilas and N. Szekely. December 18th, 1931. (378752.)

35100. "Electrical switches of the push-button type." Igranic Electric Co., Ltd. December 19th, 1930. (379180.)

1932

204. "Electric circuit interrupters." G. R. Shepherd (Westinghouse Electric & Manufacturing Co.). January 4th, 1932. (379193.)

379. "Modulated carrier-wave receivers." Marconi's Wireless Telegraph Co., Ltd. January 6th, 1931. (379195.)

475. "Metal-vapour rectifiers." Akt.-Ges. Brown, Boveri et Cie. January 7th, 1931. (379198.)

942. "Receivers for wireless telephony." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. February 24th, 1931. (379206.)

1343. "Electric driving device for sewing machines." W. C. Fairweather (Singer Manufacturing Co.). January 16th, 1932. (379209.)

1496. "Radio receivers." Marconi's Wireless Telegraph Co., Ltd. January 16th, 1931. (379212.)

3584. "Magneto ignition apparatus." R. Bosch Akt.-Ges. February 23rd, 1931. (379221.)

3965. "Electric gramophone motors." M. Kalischak. August 12th, 1931. (379224.)

4359. "Lighting fittings." Benjamin Electric, Ltd. February 16th, 1931. (379226.)

9663. "Piezo-electric coupling devices." Marconi's Wireless Telegraph Co., Ltd. April 25th, 1931. (379248.)

10117. "Means for increasing the selectivity of wireless receiving sets." Deutsche Philips Ges. April 23rd, 1931. (379249.)

18025. "Harpoon for the electric killing of whales." Aktieselskapet Elektrisk Avlivning av Hval. September 5th, 1931. (379267.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 7th.

Bettabat (lettering and design). No. 523161. Class 8. Dry batteries for use in radio-telephony.—Wireless Supplies Unlimited, 278-282, High Street, Stratford, E.15.

Ellyon. No. 527205. Class 8. Radio transmitting and receiving sets, loud speakers, and parts thereof.—E. Breitenborn, trading as "Elion," 61, Eisenbahnstrasse, Leipzig. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

N.S.F. (lettering and design). No. 533440. Class 8. Radio-telephone and telegraph apparatus, television and sound-reproducing apparatus, &c.—British N.S.F. Co., Ltd., Stafford Road, Waddon, Surrey.

Ford. No. 521459. Class 40. Junction boxes of ebonite, india-rubber-covered wire, &c.—Ford Motor Co., Ltd., 88, Regent Street, W.1.

Lektrik. No. 521111. Class 50. Insulating and non-conducting parts and electrical fittings made of moulded condensation products of formaldehyde or of similar products.—A. P. Lundberg & Sons, Ltd., 477-489, Liverpool Road, N.7.

British Belplastic (lettering and design). No. 529360. Class 50. Insulating parts of electrical apparatus, &c., made of mouldable synthetic resin materials.—Belplastic, Ltd., 81, South Row, Ladbroke Grove, W.

The "Queen of Bermuda"

The electrically propelled luxury liner "Queen of Bermuda" was launched from the Barrow-in-Furness shipyard of Vickers-Armstrongs, Ltd., on September 1st. The vessel replaces the "Bermuda," which was destroyed by fire last year.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ayrshire.—Conversion of building into shops and showrooms for Irvine and Fullarton Co-operative Society (£4,500); manager.

Barry (GLAM).—Houses (100); U.D.C. surveyor.

Bedlington (NORTHUMBERLAND).—Houses (50), Stakeford Estate; G. Towers, builder, Blyth.

Birkenhead.—Block of tenements for T.C.; G. P. Snape & Sons, builders.

Birmingham.—Alterations and improvements to premises, corner of New Street and Temple Street; J. Curtis & Sons, contractors, York Road, Leeds. Factory premises adjoining branch works of J. Lucas, Ltd., Formans Road, Sparkhill. Shops, Oulton Boulevard West, Acocks Green; A. A. Howard, architect, 25, Bennitts Hill.

Bishop's Stortford.—Houses (84), South Street, for Alfred Clark.

Blyth (NORTHUMBERLAND).—Conversion of premises at Newsham into bakery (£8,000), for the Co-operative Wholesale Society; C.W.S. architects' department, 90, Westmorland Road, Newcastle-on-Tyne.

Bradford.—Houses and shops, Cooper Lane; T. Thornton. Workshop, Ounsworth Road; Hepworth & Grandage, Ltd. Extensions to St. Barnabas Schools; C.O.E. Managers.

Bristol.—School, Connaught Road (£45,000); E. A. Poole & Son. Extensions, Cumberland Road; Tower Co. (Bristol), Ltd. Extensions to Avonmouth Docks; J. Gliksten & Son, Ltd., Carpenter's Road, E.15.

Buglawton (CHESHIRE).—Houses (24), Tall Ash site; U.D.C. surveyor.

Buxton.—Branch stores, Burbage, for the Whaley Bridge and Co-operative Society, Ltd.; Flint & Saynor, architects, 5, The Quadrant.

Canterbury.—Extensions, nurses' quarters, for the P.A.C.; H. M. Enderby, city engineer.

Cardiff.—Houses (140), Tremorfa Estate; Addicott & Sons and W. S. Eglen. Completion of Llandough Hospital (£64,560) and improvements to Llandaff Field Baths; city engineer.

Congleton (CHESHIRE).—Houses (100); borough surveyor.

Cookham (BERKS).—Residence, Winter Hill, for the Rajah of Kalsia.

Cranbrook (KENT).—Houses (26); H. Newby, Ramsgate and L. Thorpe, Southborough, builders.

Edinburgh.—Houses, Hepburn Bros. (32), and J. Miller (64). Re-erection of Maximes Ballroom, West Tollcross; proprietor.

Ely.—Houses (20) for the U.D.C.; A. E. King, surveyor.

Epsom.—R.C. schools, Dorking Road; R. Christall, 24, Heathcote Road.

Exeter.—College hostel; W. T. Nicholls, Ltd., builders, St. Paul's Road, Gloucester.

Farnworth (LANCS).—Houses, Harrowby Street (24) and Barton Road Estate (60); F. Ashton, U.D.C. surveyor, Town Hall.

Gainsborough.—Premises, Dog Island, for A. Wilkinson.

Gateshead-on-Tyne.—Houses for the T.C.; F. H. Patterson, surveyor. Branch premises for the Co-operative Wholesale Society; C.W.S. architects' department, 90, Westmorland Road, Newcastle. Slum clearance scheme, Barn Close area, for the T.C.; F. H. Patterson, borough engineer, Town Hall.

Gillingham (KENT).—Methodist church, with electrical and heating work; H. Roper, Ltd., builders, Leeds.

Glasgow.—Houses (25), Broomhill Drive; W. S. Gordon & Co.

Great Houghton (YORKS).—Extension of the Miners' Welfare Hall; W. T. Lynam, architect, Market Chambers, Hemsworth.

Hadleigh (ESSEX).—Station; London, Midland & Scottish Railway Co., Ltd.

Halifax.—Premises for Marks and Spencer, Ltd.; Bovis, Ltd., builders, 35, High Street, W.1.

Hartshorne & Seals.—Houses (36); R.D.C. surveyor.

Hawick.—Housing scheme, Welsgate; burgh surveyor.

Hindley (LANCS).—Houses (71); U.D.C. surveyor.

Horsham (SUSSEX).—Cinema, The Bishopric; U.D.C. surveyor.

Irish Free State (ENNISCORTHY, Co. WEXFORD).—Extension of County Sanatorium; secretary to the Wexford County Board of Health.

Kidderminster.—Board room, offices, &c., Oxford Street; Kidderminster Co-operative Society, Ltd.

Ledbury.—Houses (30), Oatleys Road; W. F. Bickford, surveyor and architect.

Littlehampton.—Development, Windmill site, for W. E. Butlin; H. F. Walker.

London.—(ILFORD).—Houses (1,000), Chadwell Heath; Padnall Estates, Ltd. (LEWISHAM).—Factory extension, Bromley Road; Wallis Gilbey & Partners.

Longbenton (NORTHUMBERLAND).—Houses (104); W. Bean, U.D.C. surveyor.

Long Eaton.—Factory extensions for Clutsom & Kemp, Coalville.

Luton.—Laboratory for Vauxhall Motors, Ltd. Works extensions (£16,000), for Electrolux, Ltd.; A. W. Oakley, builder, Park Street.

Lydney (GLOS)—Houses (30); Copp Bros., builders, Barry.

Malmesbury.—R.C. schools,, Holloway (£6,000); Rev. Father Alphouse Grorod.

Manchester.—Alterations and additions to Schools of Church of Corpus Christi, Miles Platting (£6,500); Moston Brick and Building Co., Ltd.

Marlow.—Alterations to Compleat Angler Hotel, River Bank; H. Knight & Son, builders, 16, Bruce Grove, N.17.

Middlesbrough.—Convent for the Community of the Holy Rood, Grove Hill; E. Thompson, builders, Dinnington Village, Ponteland.

Motherwell.—Houses (24), Wishaw; burgh surveyor.

Newbiggin-by-the-Sea (NORTHUMBERLAND).—Houses (26) and cottages (6); K. O. Kailofer, U.D.C. surveyor.

Newcastle-on-Tyne.—Garage, Toward View, for I. Pickles. Reconstruction of Maple Street Primitive Methodist Church; Committee, Y.M.C.A. Boys' Club, Fenkle Street.

Newport (I.o.W.).—Workshop, Nine Acres Lane; Stratton and Millgate, architects.

North Shields.—Houses, Hawkeys Lane, Cleveland Road and Milton Terrace; W. Stockdale, architect, 73, Howard Street. Alterations and additions to ice factory; A. K. Tasker, architect, Trinity Buildings, Newcastle-on-Tyne.

Northern Ireland (BELFAST).—Alterations and improvements to the Metropole Hotel, York Street; E. Fraser, builders, 58, Alexandra Street.

Northumberland.—School, Broomhill, for the County E.C.; W. W. Tasker, county architect, 17, Claremont Place, Newcastle.

Oldham.—Houses (60), Abbeyhills Estate; J. Ashurst, borough surveyor.

Otley.—Alterations to premises, Clapgate; Messrs. Dodgsons.

Paisley.—Shops and offices for A. Bell & Sons; Abercrombie and Maitland, architects. Totalisator, booths, &c., St. Mirren Football Ground; secretary, Clydebank Greyhound Racing Co., 54, Hope Street, Glasgow.

Pontefract.—Dairy, Horsefair; Co-operative Society, Ltd.

Portsmouth.—Factory at the civic aerodrome (£5,000); Airspeed, Ltd., York. Houses (260) and library (£3,000), Cosham; city engineer. Museum extensions, High Street (£2,470); Howe and Bishop.

Romford.—Houses, T. Blade (56) and Lawes, Cherry & Co., Ltd. (51). Block of shops and bakery; V. Locke.

Ross (HEREFORDSHIRE).—Houses (24); U.D.C. surveyor.

Rudheath (CHESHIRE).—Houses (50); Northwich R.D.C. surveyor.

Sanderstead.—Congregational church; T. E. Evans, secretary, Beech Corner, Purley Downs Road.

Sheffield.—Extensions, City General Hospital, Firvale; W. G. Davies, city architect, Town Hall.

Shoreham (SUSSEX).—Houses (44); U.D.C. surveyor. Houses (542); L. Cohen & E. Davis.

Sidcup (KENT).—Shops, Station Road; A. G. R. Ley & Son, architect, 214, Bishopsgate, E.C.2.

Southport.—Estate development, Segars Lane, Ainsdale; Ball and Percival.

South Shields.—Houses (72) for aged people at Tyne Dock; J. P. Watson, borough engineer, Town Hall.

Stockport.—Greyhound racing track, Hall Street, for Stockport Greyhound Races, Ltd.

Stretford.—Houses (30), Belford Road; McLellan & Abel. Houses (20), Dean Avenue; Sparke & Stephens, Ltd. Works extensions, Trafford Park Road; W. T. Glover & Co., Ltd. Works extensions, Westinghouse Road; Southern Oil Co., Ltd. Extensions to Sun Mills; Co-operative Wholesale Society, Ltd.

Sunderland.—Alterations to Redby Council School; O. T. Mark, John Street, education architect.

Swinton & Pendlebury.—Town hall, &c.; U.D.C. surveyor.

Treharris (GLAM).—Pithead baths; W. T. Nicholls, Ltd., builders, St. Paul's Road, Gloucester.

Tyldesley.—Schools for Parochial Council of St. George's Church; R. & W. Gregson, builders, Common Lane.

Uttoxeter.—Houses (125); U.D.C. surveyor.

Wallingford (BERKS).—Houses (30), Didcot; S. H. Floyd, architect, St. Nicholas' House, West Mills, Newbury.

Wallsend-on-Tyne.—Pithead baths, Rising Sun Colliery; J. H. Forshaw, architect, Mines Welfare Dept., Dean Stanley Street, London, S.W.1.

Watford.—Houses (130); borough surveyor.

West Riding.—School, &c., Harewood Lane, North Elmsall; education officer, County Hall, Wakefield.

West Wickham (KENT).—Conversion of Wickham Court into private hotel, for A. D. Sanderson, Selsdon Park Hotel, Croydon.

Whickham (DURHAM).—Extensions, Memorial Hospital; S. J. Stephenson, architect, 5, Saville Place, Newcastle.

Widnes.—Houses (138), Lockett Road; borough surveyor.

Witney.—Housing scheme; U.D.C. surveyor.

Wrexham.—Houses (42), Gwersyllt; R.D.C. surveyor.

York.—Houses (30), Burnolme Grove; R. Sherry. Houses (33), Lilac Avenue; H. Williamson. Factory, Fishergate; National Glassworks (York), Ltd.

Electrical Treatment of Hypertrichosis

In an article contributed to the *Medical Press*, Dr. Agnes Savill states that the pain caused by the electrolytic method of hair destruction varies with the individual to a marked extent. For the average case a No. 12 steel sewing needle is suitable; its point can be blunted by being rubbed with emery paper. The steel needle must be connected to the negative pole, as connection to the positive pole causes the iron to be driven from the needle into the tissues, causing a black stain. Current from a battery of from one to four cells should be used. The positive pole may be an electrode held by the patient who can regulate the current; make and break is less painful at the positive pole.

A fine hair is usually loosened in from five to eight seconds with ½ to ¾ mA, but a thick hair may require from 1½ to 2 mA from 10 to 20 seconds. Diathermy has also been employed for epilation, but although more rapid than electrolysis, Dr. Savill appears to regard the method less favourably than electrolysis.